Rhodora

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY.—NEW SERIES, NO. XLIII.

I. SOME NEW OR UNRECORDED COMPOSITAE CHIEFLY OF NORTHEASTERN AMERICA.

M. L. FERNALD.

DURING the past decade the large collections accumulated at the Gray Herbarium of plants from various districts of Northeastern America have contained many species unlike those ordinarily recognized in the region. Among these are numerous members of difficult genera of the *Compositae* which have from year to year been held over for further field-observation or close study. In attempting to label this accumulated material in some of the genera it has been necessary to characterize some of the plants as new, while some species heretofore considered as restricted to Northwestern America have been found to have abundant representation in the Northeast. The novelties in such genera as have been recently worked over are discussed below.

SOLIDAGO HISPIDA Muhl., as it occurs in northern New England, is a tolerably uniform plant, characterized by its densely pilose stem, its leaves pubescent upon both surfaces and its virgate or paniculate inflorescence with the heads densely clustered in elongate or short racemes. In Newfoundland and eastern Canada the plant abounds but it there varies greatly and is represented not only by the typical *S. hispida* but by four well marked varieties. One of these, var. *lanata* (Hook.) Fernald, found in Newfoundland, the Gaspé Peninsula

of Quebec and northernmost Maine, as well as on the Saskatchewan Plains has been already characterized.[1] The others, which seem not to have been heretofore distinguished, are as follows: —

S. HISPIDA, var. **disjuncta**, n. var., caulibus gracilibus 0.7–2.5 dm. altis albido-tomentosis; foliis utrinque hispidulis, basilariis spathulato-oblanceolatis 1–2 cm. latis, caulinis 2–5 infra inflorescentiam basilariis similibus; panicula racemiformi subsimplici laxe cylindrica 3–15 cm. longa, pedicellis remotis 1–5-cephalis; involucro 5–6 mm. longo.

Stems slender, 0.7–2.5 dm. high, white-tomentose: leaves hispidulous on both surfaces; the basal spathulate-oblanceolate, 1–2 cm. wide; the cauline 2–5 below the inflorescence, similar to the basal: panicle racemiform, subsimple, loosely cylindric, 3–15 cm. long; pedicels remote, 1–5-headed: involucre 5–6 mm. long. — NEWFOUNDLAND: calcareous cliffs, Steady Brook Falls, near mouth of the Humber River, July 16, 1910, *Fernald, Wiegand & Kittredge*, no. 4071 (TYPE in Gray Herb.). QUEBEC: calcareous cliffs, altitude 900–1125 m., Table-top Mountain, August 7, 1906, *Fernald & Collins*, no. 775; Montmorency Falls, August 4, 1902, *J. R. Churchill.*

S. HISPIDA, var. **tonsa**, n. var., caulibus glabris vel sparse puberulis; foliis glabris vel glabratis vel subtus ad nervos pilosis margine eciliatis vel sparse ciliatis, basilariis oblanceolatis vel anguste obovatis 1–2.5 cm. latis plerumque subacutis, caulinis 7–20 infra inflorescentiam basilariis similibus gradatim minoribus, superioribus 1–5 cm. longis 2–8 mm. latis; panicula thyrsiformi densa; involucro 3–5 mm. longo.

Stems glabrous or sparingly puberulent: leaves glabrous, subglabrate, or pilose on the nerves beneath, the margin without cilia or sparingly ciliate; the basal oblanceolate or narrowly obovate, 1–2.5 cm. wide, mostly subacute; the cauline 7–20 below the inflorescence, similar to the basal, gradually smaller; the upper 1–5 cm. long, 2–8 mm. wide: panicle thyrsiform, dense: involucre 3–5 mm. long.— NEWFOUNDLAND: serpentine tableland (altitude 550 m.) and slopes of Blomidon, August 21, 1910, *Fernald & Wiegand*, nos. 4074, 4075 (TYPE in Gray Herb.), 4076, 4077; heath on diorite tableland, alt. 380 m., Lookout Mountain, Bonne Bay, August 26, 1910, *Fernald, Wiegand & Kittredge*, no. 4079; barrens at base of serpentine tableland, Bonne Bay, August 27, 1910, *Fernald, Wiegand & Kittredge*, no. 4080. QUEBEC: Jupiter River, Anticosti, July 20, 1883, *J. Macoun;* Rivière du Loup, August, 1914, *Bro. Victorin*, no. 588. NEW BRUNSWICK: Nepisiguit Falls, August, 1873, *J. Fowler.*

In its most pronounced form closely simulating the southern *S. erecta* Pursh, but distinguished by its deep orange-yellow rays and by the greener involucre with fewer series of bracts.

S. HISPIDA, var. **arnoglossa**, n. var., caulibus crassis puberulis 2–3

[1] Hook. Fl. Bor.-Am. ii. 4 (1834); Fernald, RHODORA, x. 87 (1908).

dm. altis; foliis coriaceis supra glabris subtus sparse hirtellis, basilariis oblongo-obovatis 2.5–6 cm. latis apice rotundatis margine crenatis, caulinis 5–9 infra inflorescentiam basilariis similibus, superioribus 5–8 cm. longis 2–2.5 cm. latis; panicula thyrsiformi densa, racemis inferioribus foliis majus suffultis: involucro 4–5 mm. longo.

Stems stout, puberulent, 2–3 dm. high: leaves coriaceous, glabrous above, sparingly hirtellous beneath; the basal oblong-obovate, 2.5–6 cm. wide, rounded at apex, the margin crenate; cauline 5–9 below the inflorescence, similar to the basal; the upper 5–8 cm. long, 2–2.5 cm. wide: panicle thyrsiform, dense, the lower racemes subtended by large leaves: involucre 4–5 mm. long.— NEWFOUNDLAND: sea-cliffs, Apsey Beach, Bay of Islands, August 10, 1895, *Waghorne* (TYPE in Gray Herb.); open woods, Meadows, Bay of Islands, September 3, 1896, *Waghorne*. Fernald & Wiegand's no. 4078 from Bonne Bay is intermediate between vars. *arnoglossa* and *fallax*.

SOLIDAGO **chlorolepis**, n. sp., caulibus caespitosis gracilibus erectis vel decumbentibus 1–3 dm. altis glabris vel sparse puberulis; foliis coriaceis utrinque glabris, basilariis rosulatis spathulato-oblanceolatis apice rotundatis vel subtruncatis crenato-serratisque basi cuneato-petiolatis 2–6 cm. longis 0.6–1.3 cm. latis, caulinis remotis 3–8 infra inflorescentiam basilariis similibus; panicula racemiformi subsimplici laxe cylindrica 3.5–20 cm. longa 1.5–2 cm. diametro; pedicellis remotis monocephalis vel 2–4-cephalis valde adscendentibus 1–1.5 cm. longis hirtellis viscidis, inferioribus foliis lineari-oblanceolatis suffultis; involucro hemisphaerico 3–4 mm. alto viscido; bracteis 4–5-seriatis exterioribus crassis lanceolatis viridibus margine stramineis, interioribus stramineis apice viridibus; ligulis 15–20 circa 2 mm. longis, 0.7 mm. latis; achaeniis hispidis.

Stems caespitose, slender, erect or decumbent, 1–3 dm. high, glabrous or sparsely puberulent: leaves coriaceous, glabrous on both sides; the basal rosulate, spatulate-oblanceolate, rounded or subtruncate and crenate-serrate at apex, cuneate-petiolate at base, 2–6 cm. long, 0.6–1.3 cm. wide; cauline remote, 3–8 below the inflorescence, similar to the basal: panicle racemiform, subsimple, loosely cylindric, 3.5–20 cm. long, 1.5–2 cm. in diameter; pedicels remote, monocephalous or 2–4-headed, strongly ascending, 1–1.5 cm. long, hirtellous and viscid, the lower subtended by linear-oblanceolate leaves: involucre hemispherical, 3–4 mm. high, viscid: the bracts 4–5-seriate; the outer thick, lanceolate, green; the median narrowly oblong, obtuse, green with stramineous margin; the inner stramineous with green tip: ligules 15–20, about 2 mm. long, 0.7 mm. wide: achenes hispid.— QUEBEC: serpentine barrens and brook-ravines, headwaters of Ruisseau au Diable, altitude 700–1000 m., Mt. Albert, August 12, 1905, *Collins & Fernald*, no. 140; crevices and talus of serpentine, gulch north of Lac au Diable, Mt. Albert, July 25, 1906, *Collins & Fernald*, no. 750 (TYPE in Gray Herb.).

Originally distributed as *S. decumbens* Greene, but differing from that common Rocky Mountain species in the greener foliage, the lower cauline more rounded or subtruncate; in the more interrupted simpler inflorescence with long-pedicelled and smaller heads; in the shorter deep green outer bracts of the involucre; and in the shorter ligules.

SOLIDAGO MULTIRADIATA Ait., var. **arctica** (DC.), n. comb. *S. Virgaurea* L. μ. *arctica* DC. Prod. v. 339 (1836).

Typical *S. multiradiata* Ait. Hort. Kew. iii. 218 (1789), originally described from Labrador, is known from Hudson Strait to Newfoundland, the Gaspé Peninsula, Quebec, and Kewatin; also in Alaska (Cape Nome, etc.) and on Nunivak Island. It has the cauline leaves comparatively short and reduced below the inflorescence to small or at least not conspicuous bracts. The var. *arctica* originally described by De Candolle from Unalaska and from St. Lawrence Bay (Bering Strait), has the leaves much more elongate, the upper usually equalling or overtopping the compact inflorescence. This plant has been examined from the following stations which indicate that it is the more characteristic phase of the species in the Aleutian and adjacent Islands. UNALASKA: without locality (*Langsdorff, Mertens, Dall, Harrington*); Dutch Harbor (*Van Dyke*, nos. 22, 196); Glacier River (*Van Dyke*, no. 141): POPOFF ISLANDS: Shumagin Islands (*Harrington*): BERING STRAIT (*C. Wright*).

SOLIDAGO **mensalis**, n. sp., caule solitario 2–3 dm. alto glabro superne piloso; foliis tenuibus glabris ciliolatis supra perviridibus subtus pallidis reticulato-venosisque, basilariis anguste ellipticis longe petiolatis lamina 3–4.5 cm. longa 1–2 cm. lata acuta margine serrato-dentatis, caulinis 9–13 infra inflorescentiam cuneato-oblanceolatis breviter acuminatis, imis subpetiolatis supra mediam serrato-dentatis, mediis superioribusque sessilibus subintegris vel integris 1.5–6 cm. longis 4–12 mm. latis; inflorescentia racemiformi subsimplici laxa 3–9 cm. longa, pedicellis 1–2 cm. longis pilosis adscendentibus remote bracteolatis; involucro campanulato-hemisphaerico 7–10 mm. alto; bracteis 3–4-seriatis subaequalibus viridibus costa glutinosa, exterioribus perviridibus lanceolato-attenuatis ciliolatis, interioribus lineari-acuminatis margine pallidis; floribus circa 50, ligulis 15 circa 4 mm. longis; achaeniis maturis 4 mm. longis substrigosis.

Stem solitary, 2–3 dm. high, glabrous except for the pilose summit: leaves thin, glabrous, ciliolate, deep green above, pale and reticulate-veiny beneath; the basal narrowly elliptic, long-petioled, the lamina

3–4.5 cm. long, 1–2 cm. wide, acute, with serrate-dentate margin; cauline 9–13 below the inflorescence, cuneate-oblanceolate, short-acuminate; the lower subpetiolate, serrate-dentate above the middle, the median and upper sessile, subentire or entire, 1.5–6 cm. long; 4–12 mm. wide: inflorescence racemiform, subsimple, loose, 3–9 cm. long; pedicels 1–2 cm. long, pilose, ascending, remotely bracteolate: involucre campanulate-hemispherical, 7–10 mm. high: bracts 3–4-seriate, subequal, green, the midrib glutinous; outer very green, lance-attenuate, ciliolate; the inner linear, acuminate, with pale margin: flowers about 50; ligules 15, about 4 mm. long: mature achenes 4 mm. long, somewhat strigose.— QUEBEC: calcareous north-facing cliffs at 900–1125 m. altitude, Table-top Mountain, Gaspé County, August 7, 1906, *Fernald & Collins*, no. 778 (TYPE in Gray Herbarium).

In its thin ciliolate leaves pale and conspicuously reticulate-veiny beneath and in the texture of the involucral bracts very near *S. multiradiata* Ait., but that species has very elongate oblanceolate basal leaves and essentially entire lower and median cauline ones, and a strongly corymbiform dense inflorescence of smaller heads, the involucres 5–6 mm. high and with less attenuate bracts.

SOLIDAGO **Klughii**, n. sp., glaberrima; caule gracile stricto 6 dm. alto maculato; foliis rigidis anguste linearibus subulato-attenuatis, imis in petiolum marginatum longe attenuatis, mediis 4–10 cm. longis 2–3 mm. latis; panicula virgata 1 dm. longa 1.5 cm. diametro; involucro 3–4 mm. longo; bracteis 3-seriatis, exterioribus mediisque lanceolatis acutis crassis costa viridi glutinosa, interioribus linearibus obtusis tenuibus stramineis ciliatis; ligulis 8–10.

Very smooth: stem slender, strict, 6 dm. high, mottled: leaves rigid, narrowly linear, subulate-attenuate; the lower narrowed into a long margined petiole; the median 4–10 cm. long, 2–3 mm. wide: panicle virgate, 1 dm. long, 1.5 cm. in diameter: involucre 3–4 mm. long: bracts 3-seriate, the exterior and median lanceolate, acute, thick, with green glutinous midrib; the interior linear, obtuse, thin, stramineous, ciliate: ligules 8–10.— ONTARIO: Oliphant, Bruce County, August 14, 1905, *A. B. Klugh*, no. 3 (TYPE in Gray Herb.).

A remarkable species, closely simulating the heretofore unique and very rare *S. Guiradonis* Gray of Fresno County, California. In habit, foliage and glutinous outer bracts of the involucre the two are inseparable; but *S. Guiradonis* has only two series of bracts, these all attenuate thick and glutinous, while *S. Klughii* has a third inner series of thin scarious obtuse bracts. *S. Klughii* is also notable as an addition to the flora of the Bruce Peninsula, long famous for its unique or isolated species.

SOLIDAGO HUMILIS Pursh. In 1908 the writer [1] pointed out that the type of *S. humilis* Pursh [2] is a Newfoundland plant in the Banksian Herbarium, which is quite unlike the species (*S. racemosa* Greene) with which it was long identified. In the discussion of *S. humilis* seven years ago the exact identity of Pursh's species was left unsettled, but the statement made that it was either *S. uliginosa* Nutt. or *S. uniligulata* (DC.) Porter. At the same time it was pointed out that, as soon as its exact application should be determined, the name *S. humilis* Pursh must be taken up for one or the other of the two later species; and that those authors who had set aside the name *S. humilis* Pursh (1814) on account of a supposed earlier "*S. humilis*" of Miller (1768) could not have verified their references, for Miller had published, not "*S. humilis*" but *S. humilius*,[3] a name in the comparative degree (neuter) and certainly not the same name as *S. humilis*.

The recent collections from Newfoundland, Gaspé and the Labrador Peninsula have brought in a large number of sheets of *Solidago uliginosa* Nutt. Journ. Acad. Philad. vii. 101 (1834) and there is no question that the type of *S. humilis* Pursh is a small northern specimen of this species. It is perfectly matched in stature, habit, foliage, and even in the elongate leafy bract at the base of the slender interrupted thyrsus by such specimens as Spreadborough's no. 14324 from the Ungava River, Robinson & Schrenk's no. 210 from the Exploits River in Newfoundland, Fernald & Wiegand's no. 4098 from the shores of Ingornachoix Bay in Newfoundland, and Fernald & Collins's no. 768 from Table-top Mountain, Quebec. There is, then, no question that *S. humilis* Pursh (1814) is *S. uliginosa* Nutt. (1834). Although varying greatly in stature and in the size of the inflorescence *S. humilis* has the cauline leaves bluntly acuminate or at most acute, the rhachis and branches of the thyrsus at most short-hirtellous and the bracts of the involucre obtuse. About the ponds of the East Branch of the Humber in Newfoundland occurs a plant like *S. humilis* in habit and inflorescence but so far departing from it in details as to merit separation as

S. HUMILIS Pursh, var. **peracuta**, n. var., foliis caulinis serratis apice subulato-attenuatis; ramis hirsutis, pilis 0.5–1 mm. longis; involucri bracteis attenuatis.

Cauline leaves serrate, the apex subulate-attenuate; branches

[1] RHODORA, x. 88–90 (1908).
[2] Pursh Fl. 543 (1814).
[3] Mill. Dict. ed. viii. no. 16 (1768).

hirsute with hairs 0.5–1 mm. long: bracts of the involucre attenuate.— NEWFOUNDLAND: open rocky woods, Middle Birchy Pond, East Branch of the Humber, July 13, 1910, *Fernald & Wiegand*, no. 4097 (TYPE in Gray Herb.).

SOLIDAGO UNILIGULATA (DC.) Porter, var. **levipes**, n. var., ramis paniculae pedicellisque glabris vel glabratis glutinosisque.

Branches of the panicle and pedicels glabrous or glabrate and glutinous.— NEW YORK: Penn Yan, *Sartwell* (TYPE in Gray Herb.); Bergen Swamp, 1880, *C. H. Peck.* ONTARIO: Pt. Edward, River St. Clair, September 14, 1884, *J. Macoun.*

In typical *S. uniligulata* as it grows in the bogs from Newfoundland to New Jersey the branches or the pedicels are conspicuously hirtellous. This typical form of the species occasionally extends inland to the Great Lake Region but the plant above described seems to be an extreme confined to western New York and Ontario.

SOLIDAGO ELLIOTTII T. & G., var. **divaricata**, n. var., caule 4–5 dm. alto sparse villoso; foliis confertis ellipticis 3–6 cm. longis 1.5–2 cm. latis subtus ad nervos sparse setosis, margine grosse crenato-serratis; panicula foliosa 1–1.5 dm. longa 1–1.3 dm. lata, ramis divaricatis apice recurvatis valde secundis bracteolatisque foliis amplis suffultis.

Stem 4–5 dm. high, sparingly villous: leaves crowded, elliptic, 3–6 cm. long, 1.5–2 cm. broad, sparingly setose on the nerves beneath; the margin coarsely crenate-serrate: panicle leafy, 1–1.5 dm. long, 1–1.3 dm. broad; the branches divaricate, recurved at apex, conspicuously secund and bracteolate, subtended by ample leaves.— RHODE ISLAND: meadow northeast of Fresh Pond, Block Island, September 15, 1913, *Fernald, Long & Torrey*, no. 10,543 (TYPE in Gray Herb.).

Very strongly simulating *S. rugosa*, var. *villosa* in its leafy inflorescence with widely divergent or recurved branches; but with the involucre (5–5.5 mm. long) exactly as in *S. Elliottii*. In the slightly villous stem and the sparingly setose nerves of the leaves also suggesting *S. rugosa*, which, however, has much smaller heads.

SOLIDAGO RUGOSA Mill., var. **aspera** (Ait.), n. comb. *S. aspera* Ait. Hort. Kew. iii. 212 (1789).

Field-experience through several seasons with this plant has convinced the writer that it is better treated as an extreme variation of *S. rugosa* than as a distinct species. Var. *aspera* is more abundant southward than is typical *S. rugosa* and commonly prefers drier habitats.

SOLIDAGO LEPIDA DC. In the region including Newfoundland and southern Labrador, the Gaspé Peninsula and northern New Brunswick and northern Maine, *Solidago canadensis* L. is less common than farther south, and *S. serotina* Ait. is unknown. Here their places are occupied chiefly by a very common goldenrod, in foliage and size of heads somewhat intermediate between those two species, but with the branches of the panicle strongly ascending or but slightly secund. In this northeastern area, centering about the Gulf of St. Lawrence, this common goldenrod, with heads much larger (involucre 3–5 mm. high) than in *S. canadensis* (involucre 2–2.8 mm. high) [1] but with the stems puberulent or minutely pilose much as in that species, is quite as variable as others of the genus, but it is possible to recognize four somewhat distinct trends of the species.

About the Straits of Belle Isle and in some parts of eastern Newfoundland the plant has broadly lanceolate to oblong coarsely serrate leaves and a short compact thyrsus which is almost overtopped by the upper leaves. This plant is a good match for authentic Alaskan material and in foliage is closely matched by a fragment of the type of *Solidago lepida* DC. Prod. v. 339 (1836).

On the limestone detritus of Percé, in Gaspé County, Quebec, occurs a plant strongly resembling *S. lepida*, but with the leaves very densely cinereous-pilose. This cinereous extreme of the series has, so far as the writer can determine, received no name.

A third variant is a plant with elongate-lanceolate smoothish leaves and elongate or somewhat rhombic scarcely leafy thyrsus. This plant, abounding on the gravels of the River Ste. Anne des Monts in Gaspé County, Quebec, seems quite inseparable from extreme specimens of the northwestern *S. elongata* Nutt. Trans. Am. Phil. Soc. vii. 327 (1840).

But by far the commonest trend of the species in the Northeast is a tall plant which is clearly a very large extreme of *S. elongata* with an ample panicle. Often as large but never as secund as in *S. serotina*, but with large leaves running well into the inflorescence much as in *S. rugosa*, var. *villosa* (Pursh) Fernald,[2] this variety, in foliage and in the long branches of the inflorescence, passes directly into *S. elongata* and in the leafy character of its panicle clearly connects with the most characteristic *S. lepida*. It occurs in good development, not only in

[1] See Fernald, RHODORA, x. 92 (1908).
[2] Fernald, RHODORA, x. 91 (1908).

the Northeast — from Newfoundland and Gaspé to Montmorenci County, Quebec and Aroostook County, Maine — but is found somewhat generally across the continent: in Ontario, Michigan, Saskatchewan, British Columbia, Montana, Wyoming, Utah, &c., where it has passed variously as *S. canadensis* L., *S. serotina* Ait., *S. serotina*, var. *salebrosa* Piper, and *S. elongata* Nutt.

In all their essential characters: pubescence of stem, foliage, ascending or barely recurved branches of the inflorescence, and in the texture and size of the involucre, these plants are all obviously of one species for which the earliest name is *S. lepida* DC.; but as varieties they are fairly marked and are here proposed as

S. LEPIDA DC., var. **molina**, n. var., caule 3.5–4.5 dm. alto dense cinereo-tomentuloso subviscoso; foliis confertis oblongo-lanceolatis grosse serratis supra scabris subtus dense cinereo-pilosis subviscosis; panicula erecta terminali rhomboideo 5–9 cm. longo.

Stem 3.5–4.5 dm. high, densely cinereous-tomentulose, somewhat viscid: leaves crowded, oblong-lanceolate, coarsely serrate, scabrous above, densely cinereous-pilose and somewhat viscid beneath: panicle erect, terminal, rhomboid, 5–9 cm. long.— QUEBEC: limestone detritus of Cap Barré, Percé, August 16, 1904, *Collins, Fernald & Pease* (TYPE in Gray Herb.); gravelly slopes, Les Murailles, Percé, August 17, 1904, *Collins, Fernald & Pease* (*Pease*, no. 6220).

Cited in the 7th edition of Gray's *Manual* under *S. canadensis*, var. *gilvocanescens* Rydberg, but on account of its larger involucre and dense upright panicle better placed with *S. lepida*.

S. LEPIDA, var. **elongata** (Nutt.), n. comb. *S. elongata* Nutt. Trans. Am. Phil. Soc. vii. 327 (1840).

S. LEPIDA, var. **fallax**, n. var., caule 0.5–1.5 m. alto, supra minute piloso; foliis lanceolatis vel oblanceolatis 0.5–1.5 dm. longis argute serratis acuminatis supra glabris vel plus minusve scabris, subtus ad nervos scabris; panicula erecta subcorymbiformi vel pyramidali 1–3 dm. longa, 0.7–2 dm. lata, ramis adscendentibus vix vel paulo recurvatis inferioribus foliis elongatis suffultis; involucro 3–5 mm. longo, bracteis circa 3-seriatis lineari-lanceolatis tenuibus.

Stem 0.5–1.5 m. high, minutely pilose above: leaves lanceolate or oblanceolate, 0.5–1.5 dm. long, coarsely sharp-serrate, acuminate, glabrous or more or less scabrous above, scabrous on the nerves beneath: panicle erect, somewhat corymbiform or pyramidal, 1–3 dm. long, 0.7–2 dm. wide; the branches ascending, not at all or only slightly recurved, the lower subtended by elongate leaves: involucre 3–5 mm. long; bracts about 3-seriate, linear-lanceolate, thin.— Newfoundland to British Columbia, south to northern New Brunswick, northern Maine, northern Michigan, Utah and Washington.

The following specimens are characteristic. NEWFOUNDLAND: rocky soil, base of cliff, near Topsail, Conception Bay, August 12–19, 1901, *Howe & Lang*, no. 1282; gravelly thicket, Harry's River, August 18, 1910, *Fernald & Wiegand*, no. 4108 (TYPE in Gray Herb.); damp thickets, Grand Falls, August 11, 12, & 14, 1911, *Fernald, Wiegand & Darlington*, nos. 6298, 6299, 6300. QUEBEC: gravel-beaches and bars, River Ste Anne des Monts, August 3–17, 1905, *Collins & Fernald;* alluvial woods at mouth of Bonaventure River, July 31, 1902, *Williams & Fernald*, August 4, 1904, *Collins, Fernald & Pease* (*Pease*, no. 5918); vicinity of Cap à l'Aigle, August, 1905, *J. Macoun*, nos. 68,376, 68,378; Ste Anne de Beaupré, August 30, 1905, *J. Macoun*, no. 68,375. NEW BRUNSWICK: border of woods, Four Falls, Victoria County, August 11, 1909, *Fernald*, no. 2232. MAINE: river-thicket, Fort Fairfield, August 15, 1901, *Robinson & Fernald*. ONTARIO: Onaman River, Thunder Bay District, 1912, *H. E. Pulling*. MICHIGAN: shaded ditches, Keewanaw County, October, 1887, *Farwell*, no. 491 (very pubescent). SASKATCHEWAN: *Bourgeau*, 1858. BRITISH COLUMBIA: flood plain of the Columbia at Beavermouth, August 18, 1905, *Shaw*, no. 1166. WYOMING: Snake River, August 13; 1899, *Nelson*, no. 6441. UTAH: Utah Valley, July, 1869, *Watson*, no. 562. WASHINGTON: Granville, July 18, 1902, *Conard*, no. 347; valley of Swauk River, 1913, *S. P. Sharples*, no. 238.

Passing by numerous transitions on the one hand to the more condensed typical *S. lepida*, on the other to var. *elongata* with its more elongate and more definitely terminal thyrsus. Often confused in the Herbarium with *S. serotina* Ait., which has the stems glabrous up to the inflorescence with its strongly secund branches, and the heads usually larger. In the East more often confounded with *S. canadensis* L. which has similar foliage and similarly pubescent stems, but very small heads (the involucre 2–2.8 mm. long) on strongly recurving branches. In its more pubescent extremes simulating the more southern *S. altissima* L., which has the very cinereous leaves thick and usually entire and the involucral bracts firmer and less attenuate.

SOLIDAGO **Bartramiana**, n. sp., caulibus caespitosis gracilibus glabris vel supra sparsissime pilosis 2–3.5 dm. altis; foliis uniformibus lanceolato-attenuatis triplinerviis tenuibus 3–6 cm. longis 4–8 mm. latis utrinque glabris vel subtus ad nervos scabris, margine integris vel obsolete serratis scabris; panicula erecta terminali thyrsiformi vel corymbiformi 3–12 cm. longa 2–7 cm. lata, ramis arcte adscendentibus inferioribus foliis elongatis suffultis; capitulis paucis plerumque longe pedicellatis, pedicellis 7–12 mm. longis setulosis minute bracteolatis; involucro 2.5–3 mm. longo, bracteis 1–2-seriatis 10–15 lineari-attenuatis glabris tenuibus viridescentibus; ligulis circa 10; achaeniis ma-

turis 1.5–2 mm. longis hispidis; pappo 1.5–2 mm. longo, setibus basi plerumque flexuosis.

Stems caespitose, slender, glabrous or above very sparsely pilose, 2–3.5 dm. high: leaves uniform, lance-attenuate, triple-nerved, thin, 3–6 cm. long, 4–8 mm. wide, glabrous on both surfaces or scabrous on the margin beneath, entire or obsoletely serrate, the margin scabrous: panicle erect, terminal, thyrsiform or corymbiform, 3–12 cm. long, 2–7 cm. wide; the branches strongly ascending, the lower subtended by elongate leaves: heads few, mostly long-pedicelled; the pedicels 7–12 mm. long, setulose and minutely bracteolate: involucre 2.5–3 mm. long; the bracts 1–2-seriate, 10–15, linear-attenuate, glabrous, thin, greenish: ligules about 10: mature achenes 1.5–2 mm. long, hispid: pappus 1.5–2 mm. long, the bristles usually flexuous at base.—NEWFOUNDLAND: ledges and talus, north bank of Exploits River below the falls, Grand Falls, July 22, 1911, *Fernald, Wiegand, Bartram & Darlington*, no. 6303 (TYPE in Gray Herb.).

Named for Edwin Bunting Bartram, President of the Philadelphia Botanical Club and worthy representative of a distinguished botanical name, who first detected the plant at its type-locality. *S. Bartramiana* in habit resembles *S. lepida* and its var. *fallax*, but is at once distinguished from all the varieties of *S. lepida* by its glabrous stems, long-pedicelled heads and almost uniseriate involucres. At Grand Falls *S. Bartramiana* was mature (with ripe fruit) on July 22, while at the same locality *S. lepida*, var. *fallax* was fully a month later, collected in young flowering condition the middle of August.

SOLIDAGO CANADENSIS L., var. **Hargeri**, n. var., caulibus villosis; foliis lanceolatis argute serratis supra scabris subtus cinereo-puberulis.

Stems villous: leaves lanceolate, sharply serrate, scabrous above, cinereous-puberulent beneath.—Valleys of the Deerfield and Housatonic Rivers, Massachusetts and Connecticut. MASSACHUSETTS: roadside, Florida, August 27, 1904, *Ralph Hoffmann*. CONNECTICUT: roadside near the Housatonic River, at Bennett's Bridge, Southbury, October 1, 1901, *E. B. Harger* (TYPE in Gray Herb.); dry soil near the Housatonic River, Oxford, August 15, 1910, *Harger*.

This plant, specially called to my attention by Mr. E. B. Harger, is frequent in the Housatonic Valley. It has the tiny heads, characteristic inflorescence, and "triple-nerved" leaves of *Solidago canadensis* L., but differs strikingly from the typical form of that species (which has the stems glabrous or merely a little pilose except near the inflorescence and the leaves at most pilose along the nerves beneath) in having the upper half or two-thirds of the stem villous and the leaves closely cinereous-puberulent beneath as in the large-headed *S.*

altissima L. In the pubescence of the stem the plant suggests *S. rugosa* but there the resemblance ceases, for Mr. Harger's plant has the definitely "triple-nerved" leaves of *S. canadensis*. In the cinereous-puberulent lower surfaces of the leaves it is suggestive of the common western *S. canadensis*, var. *gilvocanescens* Rydberg, which is found locally as far eastward as Vermont,[1] but that variety has the stems cinereous-pulverulent or at most puberulent. The plant of the Housatonic Valley, with villous stems, which Mr. Harger reports having seen at a number of stations in Connecticut, extends northward to the Deerfield Valley in Massachusetts, and it seems to be a distinct geographic variety.

SOLIDAGO GRAMINIFOLIA (L.) Salisb., var. **septentrionalis**, n. var., caule glabro vel subglabro; foliis perviridibus lanceolatis vel oblongo-lanceolatis nec attenuatis apice obtusiusculis glabris vel subtus ad nervos paulo setulosis; corymbo laxo ramis lateralibus valde elongatis; capitulis plerumque glomerulatis; pedicellis paulo setulosis; involucro 4–4.5 mm. alto, bracteis apice viridibus.

Stem glabrous or nearly so: leaves deep green, lanceolate or oblong-lanceolate, not attenuate, bluntish, glabrous or beneath a little setulose on the nerves: corymb loose, the lateral branches conspicuously elongate: heads mostly glomerulate: pedicels a little setulose: involucre 4–4.5 mm. high; bracts green at tip.—NEWFOUNDLAND: ledges, talus and gravel, north bank of Exploits River below the falls, Bishop Falls, July 28, 1911, *Fernald, Wiegand & Darlington*, no. 6305, and Grand Falls, August 12, 1911, no. 6306 (TYPE in Gray Herbarium); and gravelly railroad embankment, Grand Falls, August 14, 1911, no. 6307. QUEBEC: gravelly beach of St. John (or Douglastown) River, Gaspé County, August 23, 1904, *Collins, Fernald & Pease*.

The representative of the continental *S. graminifolia* in central Newfoundland and the Gaspé Peninsula, differing strikingly in foliage from the typical form of the species which has the narrower leaves long-attenuate to sharp tips and the corymb ordinarily much denser, with branches of more uniform length. In the outline of its leaves var. *septentrionalis* suggests the western var. **camporum** (Greene), n. comb., = *Euthamia camporum* Greene, Pittonia, v. 74 (1902); but that plant has the firmer leaves light green, the corymb comparatively dense and the involucral bracts pale throughout. In the green-tipped involucral bracts var. *septentrionalis* suggests var. **polycephala** (Fernald), n. comb., = *S. polycephala* Fernald, RHODORA, x. 93 (1908); *Euthamia floribunda* Greene, Pittonia, v. 74 (1902), not *S. floribunda*

[1] **Proctor, Vermont, *W. W. Eggleston* in Gray Herb.**

Phil. Anal. Univ. Chil. lxxxvii. 430 (1894). But this apparently local plant of New Jersey, eastern Pennsylvania and Maryland has the leaves long-attenuate, the pedicels copiously setulose, and the involucres only 3–3.5 mm. high, and seems to be a small-headed extreme nearest allied to var. *Nuttallii* (Greene) Fernald.

Aster **johannensis**, n. sp., caule solitario gracile 4 dm. alto glabro; foliis oblanceolatis utroque attenuatis acuminatis basi subcordatis supra scabris subtus glabris margine remote serratis, mediis 6–8 cm. longis 1–1.2 cm. latis: pedicellis paucis (3–5) monocephalis 5–9 cm. longis 3–5 foliis parvis instructis involucro hemisphaerico 7–8 mm. alto, bracteis valde 2–3-seriatis herbaceis anguste linearibus 0.7–1 mm. latis apice subulatis; ligulis violaceis 1–1.3 cm. longis anguste linearibus; pappi setis 1-seriatis barbellulatis; achaeniis setosis.

Stem solitary, slender, 4 dm. high, glabrous: leaves oblanceolate, narrowed to both ends, acuminate, at base subcordate, scabrous above, glabrous beneath, the margin remotely serrate; the median 6–8 cm. long, 1–1.2 cm. wide: pedicels few (3–5) monocephalous, 5–9 cm. long, provided with 3–5 small leaves: involucre hemispherical, 7–8 mm. high; the bracts obviously 2–3-seriate, herbaceous, narrowly linear, 0.7–1 mm. wide, subulate at apex: ligules violet, 1–1.3 cm. long, narrowly linear: pappus-bristles 1-seriate, minutely barbellate: achenes setose.— Quebec: near Ouatchouan Falls, Lake St. John, August 19, 1904, *W. F. Wight*, no. 228 (type in Gray Herb.).

Related to *A. junceus* Ait., but with larger heads, much more herbaceous but subulate-tipped involucral bracts, and broader coarsely serrate leaves. In its involucre exactly matching the western *A. Fremonti* Gray, but clearly distinct in its nearly uniform and serrate cauline leaves.

Aster foliaceus Lindl. In extreme eastern British America and northern New England the difficulties of clearly distinguishing the large-headed Asters of the section *Vulgares* (*A. novi-belgii* L., *A. longifolius* Lam., etc.) are further complicated by the abundance of a plant which in some characters differs from the ordinarily recognized eastern Asters. This heretofore little recognized eastern plant abounds in the river-valleys and on the damp mountain slopes of Newfoundland, southern Labrador, and eastern Quebec, extending westward to Portneuf County, Quebec and southward to northern Maine and northern New Hampshire. Its chief characters separating it from *A. novi-belgii* and *A. longifolius* are its very few large heads (involucre, excluding the enlarged outer bracts, 7–9 mm. high) chiefly

solitary on elongate pedicels which are naked or have 1 or 2 large dilated foliaceous bracts, and the essentially equal herbaceous or foliaceous involucral bracts. This plant with few long-pediceled heads is quite as variable as other species of its affinity, but in spite of its great variability it holds within the Hudsonian and Canadian area indicated the characters above defined and seems to be a pronounced trend such as is ordinarily considered a species in the genus *Aster*. The lower plants from alpine, subalpine and more northern habitats, with the "short monocephalous branches leafy about the heads,"[1] exactly coincide with authentic material from the original Alaskan localities of *A. foliaceus* Lindl.; while in some colonies the plants are an exact match for the original specimens of the Rocky and Cascade Mountain var. *frondeus* Gray, having the tall stems bearing "ample" leaves 1–1.5 dm long and 2 3.5 cm. broad and many of the heads on long almost erect naked or nearly naked pedicels (often 5–15 cm. long). One of the eastern variants with foliage as in var. *frondeus* departs from that variety in its loosely arching pedicels; another strongly suggests the original Parry specimens (no. 417) from Colorado of var. *Parryi* Gray but differs from that little known plant in its more uniform foliage; another variant from the Gaspé coast with short crenate leaves and nearly uniformly leafy pedicels and outer involucral bracts, is an extreme departure from the others and simulates none of the western varieties known to the writer, while a fourth tendency, from western Newfoundland, has the unusually small heads mostly in pairs at the tips of the pedicels and the involucres almost lacking the enlarged foliaceous outer bracts.

These four undescribed northeastern varieties are so pronounced in their characters as to merit special designation as

A. FOLIACEUS Lindl., var. **arcuans**, n. var., caule 0.6–1 m. alto superne flexuoso; foliis tenuibus rhomboideo-lanceolatis acuminatis remote serratis, mediis 1–2 dm. longis 2–3.5 cm. latis; ramis pedicellisque laxe arcuato-adscendentibus, pedicellis 3–9 cm. longis monocephalis efoliatis vel remote cum 1–3 foliis oblongis instructis; involucro 8–10 mm. alto, bracteis lanceolatis herbaceis vel exterioribus foliaceis elongatisque.

Stem 0.6–1 m. high, flexuous above: leaves thin, rhombic-lanceolate, acuminate, remotely serrate; the median 1–2 dm. long, 2–3.5 cm. wide; branches and pedicels loosely arcuate-ascending; the pedicels 3–9 cm. long, monocephalous, naked or remotely provided with

[1] Gray, Syn. Fl. i., pt. 2, 193 (1884).

1–3 oblong leaves: involucre 8–10 mm. high, with the bracts lanceolate or with the outer foliaceous and elongate.— QUEBEC: alluvium of the St. John (or Douglastown) River, Gaspé County, August 23, 1904, *Collins, Fernald & Pease* (TYPE in Gray Herb.); alluvial thickets and woods near the mouth of Dartmouth River, Gaspé County, August 26 & 27, 1904, *Collins, Fernald & Pease;* alluvium of York River, Gaspé County, July 29, 1905, *Williams, Collins & Fernald* (transitional to var. *frondeus*).

Resembling var. *frondeus* but differing in its more serrate leaves and in the much more spreading or arching branches and pedicels.

A. FOLIACEUS, var. **crenifolius**, n. var., caule 2.5–3.5 dm. alto; foliis crassis ellipticis basi apiceque angustatis subobtusis crenatis subtus pilosis, mediis 4.5–8 cm. longis 1.7–2.5 cm. latis; ramis pedicellisque subadscendentibus; pedicellis 1–3 cm. longis monocephalis foliis oblongis crenatis instructis; involucro 8–10 mm. alto, bracteis exterioribus foliaceis oblongis.

Stem 2.5–3.5 dm. high; leaves thick, elliptic, narrowed to base and apex, bluntish, crenate, pilose beneath; the median 4.5–8 cm. long, 1.7–2.5 cm. wide: branches and pedicels subascending; pedicels 1–3 cm. long, monocephalous, provided with oblong crenate leaves: involucre 8–10 mm. high, with the outer foliaceous bracts oblong.— QUEBEC: recent clearing near the mouth of Grand River, Gaspé County, August 11–15, 1904, *Collins, Fernald & Pease* (TYPE in Gray Herb.).

In habit somewhat intermediate between the typical form of the species and var. *arcuans;* differing from both in the very crenate leaves and the uniform leafiness of the pedicels.

A. FOLIACEUS, var. **subpetiolatus**, n. var., caule 3–7 dm. alto glabro vel piloso; foliis patentibus vel subadscendentibus subcoriaciis glabris anguste rhomboideo-ovatis longe acuminatis basi angustatis remote serratis vel subintegris, mediis late subpetiolatis 1–1.5 dm. longis 2–4 cm. latis; ramis subadscendentibus; pedicellis plerumque 1.5–4 cm. longis monocephalis efoliatis vel apice cum foliis elongatis acuminatis instructis; involucro 8–10 mm. alto, bracteis lanceolato-attenuatis exterioribus plus minusve foliaceis.

Stem 3–7 dm. high, glabrous or pilose: leaves spreading or somewhat ascending, subcoriaceous, glabrous, narrowly rhombic-ovate, long-acuminate, narrowed at base, remotely serrate or subentire; the median broadly subpetioled, 1–1.5 dm. long, 2–4 cm. wide: branches subascending: pedicels mostly 1.5–4 cm. long, monocephalous, leafless or with elongate acuminate leaves at apex: involucre 8–10 mm. high, with lance-attenuate bracts, the outer more or less leafy.— QUEBEC: crests of sea-cliffs, Grand River, Gaspé County, August 11–15, 1904, *Collins, Fernald & Pease* (TYPE in Gray Herb.); calcareous shingle at base of Cap Tourelle, and gravel by Ruisseau Patate,

Tourelle, August 19–21, 1905, *Collins & Fernald;* springy coniferous woods along "Low's Trail," at base of Table-top Mountain, August 14, 1906, *Collins & Fernald*, no. 738; banks of Becscie River, Anticosti, July 31, 1883, *J. Macoun*, no. 7.

Somewhat simulating *A. foliaceus*, var. *Parryi* Gray, but that plant, as represented by the original Parry material from Colorado, has the strongly ascending leaves smaller and rapidly decreasing to the summit, and the corymb much less leafy than in var. *subpetiolatus*, which in its extreme form suggests some forms of the smaller-headed *A. tardiflorus* L.

A. FOLIACEUS, var. **subgeminatus**, n. var., caule 2.5–5 cm. alto, glabro; foliis adscendentibus ellipticis vel anguste elliptico-ovatis longe acuminatis basi subpetiolaribus serratis, mediis 7–12 cm. longis 1.5–2.5 cm. latis; ramis pedicellisque perbrevibus arcte adscendentibus, pedicellis plerumque apice 2-cephalis; involucro 5–6 mm. alto, bracteis oblanceolatis chartaceis apice valde herbaceis.

Stem 2.5–5 cm. high, glabrous; leaves ascending, elliptic or narrowly elliptic-ovate, long-acuminate, with subpetiolar base, serrate; the median 7–12 cm. long, 1.5–2.5 cm. broad: branches and pedicels very short, strongly ascending, the pedicels usually terminated by 2 heads: involucre 5–6 mm. high; its bracts linear-oblanceolate, chartaceous, conspicuously herbaceous at tip.— NEWFOUNDLAND: damp bushy ravine in the limestone tableland, altitude 200–300 m., Table Mountain, Port-à-Port Bay, August 16, 1910, *Fernald, Wiegand & Kittredge*, no. 4126.

In foliage strongly resembling vars. *Parryi* and *subpetiolatus*, in habit like typical *A. foliaceus*, but distinguished from all the described varieties in its small usually paired heads and in the absence of the outer foliaceous bracts. In foliage also suggesting *A. tardiflorus* L. (unknown in Newfoundland) but readily distinguished by its broader and firmer involucral bracts and by the very few short erect pedicels. Material from the valley of Harry's River (no. 4120) strongly simulates var. *subgeminatus*, but has the involucre with more foliaceous outer bracts.

ASTER **anticostensis**, n. sp., caule solitario 4 dm. alto, subflexuoso glabro; foliis coriaceis lineari-lanceolatis utroque attenuatis basi subcordatis margine integris scabris, mediis 1.2–1.6 dm. longis 1 cm. latis; ramis arcte adscendentibus, pedicellis plerumque 2–5 cm. longis monocephalis efoliatis vel 1–2 foliis instructis: involucro hemisphaerico 1 cm. alto, bracteis valde imbricatis 3–4-seriatis, oblongis 1.5–2 mm. latis duris vel subcoriaceis flavescentibus apice subherbaceis; ligulis violaceis circa 1.5 cm. longis; pappo 1-seriato setis barbellatis; achaeniis setosis.

Stem solitary, 4 dm. high, subflexuous, glabrous: leaves coriaceous, linear-lanceolate, attenuate to both ends, the base subcordate, the margin entire scabrous; the median 1.2–1.6 dm. long, 1 cm. wide: branches strongly ascending; pedicels mostly 2–5 cm. long, 1-headed, leafless or with 1 or 2 leaves: involucre hemispherical, 1 cm. high; the bracts strongly imbricated in 3–4 series, oblong, 1.5–2 mm. wide, hard or somewhat leathery, yellowish, subherbaceous at tip: ligules violet, about 1.5 cm. long: pappus 1-seriate, the setae barbellate: achenes setose.— QUEBEC: river banks and grassy slopes, Jupiter River, Anticosti, July 20, 1880, *J. Macoun*, no. 6 (TYPE in Gray Herb., distributed as *A. paniculatus*).

A puzzling plant, in its monocephalous elongate pedicels simulating *A. foliaceus* but with very slender elongate leathery leaves like those of extreme *A. longifolius*. In the involucre, with its very broad firm bracts strongly imbricated, unlike any Eastern *Aster*, but somewhat suggesting some extreme specimens referred to the Northwestern *A. Douglasii* Lindl. In habit and involucre *A. anticostensis* strongly suggests the subarctic *A. spathulatus* Lindl., but that little-known plant has spatulate-oblanceolate leaves and the involucre less imbricated. When better known the two may be found to have closer affinities than are at present evident.

ASTER PUNICEUS L., var. **perlongus**, n. var., caule tenui hispido 4–5.5 dm. alto; foliis tenuibus sublucidis utrinque glabris linéari-lanceolatis vel -oblanceolatis acuminato-attenuatis basi valde cordato-amplexicaulibus minute serratis vel subintegris, mediis 1–2 dm. longis 1.2–2.2 cm. latis; ramis brevibus; involucri bracteis linearibus attenuatis laxis.

Stem slender, hispid, 4–5.5 dm. high: leaves thin, somewhat lustrous, glabrous on both sides, linear-lanceolate or -oblanceolate, acuminate-attenuate, strongly cordate-clasping at base, minutely serrate or subentire; the median 1–2 dm. long, 1.2–2.2 cm. wide: branches short: involucre with loose linear-attenuate bracts.— QUEBEC: springy spots in coniferous forest along "Low's Trail," altitude about 675 m., western base of Table-top Mountain, Gaspé County, August 14, 1906, *Fernald & Collins*, no. 737 (TYPE in Gray Herb.).

A very distinct extreme in its exceedingly slender and thin almost entire leaves.

ERIGERON HYSSOPIFOLIUS Michx., var. **villicaulis**, n. var., humilis 5–15 cm. altus vix caespitosus; caulibus simplicibus vel subsimplicibus pedicellisque dense villosis; foliis plus minusve villosis longe ciliatis.

Low, 5–15 cm. high, scarcely caespitose: the simple or subsimple stems and the pedicels densely villous: leaves more or less villous,

long-ciliate.— NEWFOUNDLAND: dry exposed ledges and shingle on the limestone tableland, altitude 200–300 m., Table Mountain, Port à Port Bay, July 16 & 17, 1914, *Fernald & St. John*, no. 10,866 (TYPE in Gray Herb.).

A very extreme variant of the common little *Erigeron hyssopifolius* of slaty and calcareous gravels and damp ledges in the Canadian and Hudsonian districts. Ordinarily (and in Michaux's type material) the taller branching and densely tufted stems and the pedicels are glabrous or only sparingly pilose and the otherwise glabrous leaves are at most sparingly short-ciliolate on the margin and midrib.

ARNICA **pulchella,** n. sp., rhizomate 2–4 cm. longo horizontali vel suberecto; caule solitario 1–1.8 dm. alto villoso, pilis albidis ad 2 mm. longis cum glandulis stipitatis minutis mixtis; foliis imis lanceolatis vel oblanceolatis 3–15 cm. longis 5–12 mm. latis acutiusculis apice calloso mutico basi in petiolos marginatos angustatis utrinque glandulosis laxe villosisque pilis 1–1.5 mm. longis, margine integris vel remote callosodentatis; foliis caulinis 1–2 jugis, inferioribus lanceolatis 2–4.5 cm. longis glandulosis villosisque apice calloso mutico, superioribus multo minoribus linearibus vel lanceolatis 1–3 cm. longis apice saepe lineari-attenuato scarioso; capite 1 pulchro 4.5 cm. diametro: involucro circa 1.5 cm. alto basi dense villoso supra glanduloso laxe villosoque; bracteis 8–10, anguste rhomboideis 3–3.5 mm. latis a medio ad apicem longe attenuatum tenuem angustatis; ligulis circa 10 luteis, lamina 1.3–1.5 cm. longa 7–8 mm. lata valde 7–9-nervata dorso strigosa apice argute 3–4-dentata, dentibus longioribus 3–5 mm. longis; achaeniis 6–7 mm. longis hirsutis; pappo circa 7 mm. longo albo, setibus barbellatis.

Rhizome 2–4 cm. long, horizontal or suberect: stem solitary, 1–1.8 dm. high, villous especially above; the white hairs up to 2 mm. long, mixed with minute stipitate glands: basal leaves lanceolate or oblanceolate, 3–15 cm. long, 5–12 mm. wide, acutish with a blunt callous tip, narrowed to margined petioles, glandular and loosely villous on both surfaces (the hairs 1–1.5 mm. long), margin entire or remotely callous-dentate: cauline leaves 1 or 2 pairs; the lower lanceolate, 2–4.5 cm. long, glandular and villous, with a blunt callous tip; the upper much reduced, linear or lanceolate, 1–3 cm. long, often with a linear-attenuate scarious appendage at tip: heads solitary, very handsome, 4.5 cm. broad; involucre about 1.5 cm. high, densely villous at base, glandular and loosely villous above; bracts 8–10, narrowly rhombic, 3–3.5 mm. broad, tapering from the middle to a long-attenuate thin tip: rays about 10, orange-yellow; the oblong-ovate blade 1.3–1.5 cm. long, 7–8 mm. broad, conspicuously 7–9-nerved, strigose on the back, the apex sharply 3–4-toothed, the longest teeth 3–5 mm. long: achenes 6–7 mm. long, hirsute: pappus about

7 mm. long, white; the bristles barbellate.— NEWFOUNDLAND: dry exposed ledges and shingle on the limestone tableland, altitude 200–300 m., Table Mountain, Port à Port Bay, July 16 & 17, 1914, *Fernald & St. John*, no. 10,874 (TYPE in Gray Herb.).

Intermediate between *Arnica alpina* (L.) Olin & Ladan of the Arctic and of northern Labrador and *A. tomentosa* J. M. Macoun of the Canadian Rocky Mountains. In *A. alpina*, which *A. pulchella* resembles in the shape and the tips of the leaves, the pubescence of the leaves and the lower half of the stem is very sparse and short, the involucre consists of 15–20 narrower less pubescent bracts; and the narrower rays are much less cleft, the blunter lobes being 1–2 mm. long. In the northwestern *A. tomentosa* the basal leaves are thicker than in *A. pulchella*, more prominently nerved and blunter, and covered with much longer pubescence; the upper leaves lack the slender apical appendage which is present in well developed *A. pulchella;* the pubescence of the stem and the involucre is very much longer and more copious (almost lanate); the bracts of the involucre are bluntish or merely acute; and the thicker and less prominently nerved rays have a longer pubescence on the back.

HIERACIUM CANADENSE Michx., var. **hirtirameum**, n. var., caule 2–8 dm. alto villoso-hirsuto vel infra glabrescente; foliis inferioribus ciliatis subtus plus minusve hirsutis; ramis pedicellisque gracilibus valde adscendentibus vel subfastigiatis copiose longe hirsutis, pilis 1.5–3 mm. longis cum glandulis minutis mixtis; involucro campanulato-hemisphaerico 5–10 mm. longo; bracteis circa 3-seriatis fuscis, exterioribus glanduloso-hirsutis.

Stems 2–8 dm. high, villous-hirsute or below glabrescent: lower leaves ciliate, more or less hirsute beneath: branches and pedicels slender, strongly ascending or somewhat fastigiate, copiously long-hirsute; the trichomes 1.5–3 mm. long, mixed with minute glands: involucre campanulate-hemispheric, 5–10 mm. long: bracts about 3-seriate, fuscous; the outer glandular-hirsute.— Newfoundland, eastern Quebec and northern Maine.— NEWFOUNDLAND: clearings and borders of thickets, Clarenville, August 19 & 20, 1911, *Fernald & Wiegand*, no. 6437; ledges, talus and gravel, north bank of Exploits River below the falls, Bishop Falls, July 28, 1911, *Fernald, Wiegand & Darlington*, no. 6433 (TYPE in Gray Herb.); dry, rocky clearing, Grand Falls, July 25, 1911, *Fernald, Wiegand, Bartram & Darlington*, no. 6432. QUEBEC: damp calcareous ledges and cliffs, between Baldé and Baie des Chaleurs, Bonaventure River, August 5–8, 1904, *Collins, Fernald & Pease;* damp ledges and cliffs, Little Cascapedia River, July 29 & 30, 1904, *Collins, Fernald & Pease;* ledgy banks of

Restigouche River, Matapedia, July 19, 1904, *Fernald.* MAINE: shaded bank of St. John River, Allagash, August 11, 1893, *Fernald;* wooded bank of St. John River, Van Buren, September 18, 1900, *Fernald;* rocky island in Penobscot River, Upper Stillwater, September 18, 1899, *Fernald.*

A puzzling plant, in its characteristic development very different from the commonly larger *H. canadense*, but presenting numerous perplexing transitions. The variety seems to be more inclined than the species to an aberrant development (possibly pathological) in which the branches become shortened and crowded among the reduced upper leaves, the heads in these aberrant individuals becoming very numerous and tiny (with involucres only 2 or 3 mm. long).

II. SOME ANOMALOUS SPECIES AND VARIETIES OF BIDENS IN EASTERN NORTH AMERICA.

M. L. FERNALD AND HAROLD ST. JOHN.

In 1909 a peculiar *Bidens* was found on the tidal flats of Winnegance Creek, near the mouth of the Kennebec River in Maine, and at that time identified [1] with the northern *B. hyperborea* Greene, which was already known from James Bay and the estuaries of streams entering the Gulf of St. Lawrence. Subsequently the Maine plant has been found not only along Winnegance Creek, but on the tidal reaches of the Androscoggin at Topsham and Brunswick. Although in its erect outer involucral bracts it strongly simulates *B. hyperborea*, the plant of the lower Androscoggin and Kennebec shows many characters which indicate that its affinity is more nearly with *B. Eatoni* Fernald of the tidal flats of the Merrimac River. In *B. hyperborea* the heads are slenderly cylindric-campanulate; the chaff dark-striate; the achenes consistently 4-awned and many-striate, the inner nearly or quite 1 cm. long. In the plant of the lower Androscoggin and Kennebec the heads are turbinate-hemispherical, the chaff pale, often inconspicuously striate; the achenes consistently 2-awned, the inner 6 mm. long; and ordinarily the primary leaves more acuminate at tip

[1] Fernald & Wiegand, RHODORA, xii. 120, 144 (1910).

and with more numerous teeth. In its nearest relative, *B. Eatoni*, the leaves are all slender-petioled, the heads slender-cylindric, the inner involucre in well developed heads 1–1.5 cm. long, the chaff dark-striate, and the achenes usually 4-awned, the inner ones 7–9 mm. long and scarcely or only faintly striate; while in the plant from Maine the upper leaves are sessile, the inner involucre of well developed heads 5–8 mm. long, and the achenes are copiously channeled.

In its foliage and in the breadth of the larger heads the plant from the lower Androscoggin and Kennebec closely simulates extreme slender forms of *B. cernua* L., but that species has the nodding heads depressed-hemispherical in outline with a nearly flat base, the outer foliaceous bracts spreading, the chaff dark-striate, and the 4-awned achenes strongly 4-angled at summit and tuberculate on the angles. In the Maine plant, however, the erect heads have somewhat turbinate involucres, with erect outer foliaceous bracts, and the 2-awned achenes are flat and without tuberculate hairs.

Differing in all its essential characters from the three species which it most nearly resembles, the plant from the estuary of the Kennebec and Androscoggin Rivers seems to be another of the localized estuary species comparable with *B. bidentoides* (Nutt.) Britton, known only from the estuary of the Delaware, *B. Eatoni* Fernald, known only from the estuary of the Merrimac, and *B. hyperborea* Greene of the river-estuaries entering the Gulf of St. Lawrence and James Bay. The Maine plant we propose as

Bidens **colpophila**, n. sp., glaberrima subcarnosa; caule erecto 1–4 dm. alto simplice vel ramoso, ramis arcte adscendentibus; foliis oblanceolato-acuminatis; imis subpetiolatis; mediis superioribusque sessilibus 0.5–1 dm. longis 6–13 mm. latis remote serratis, serris utrinque 3–10; capitulis erectis; involucro turbinato-hemisphaerico, bracteis exterioribus foliaceis arcte adscendentibus glabris lineari-lanceolatis acutis vel subacutis 1.5–4 cm. longis, bracteis interioribus oblongis subacutis flavis badeo-striatis; paleis anguste oblongis flavis obsolete pallideque striatis; achaeniis anguste cuneatis planis utrinque valde circa 9-striatis retrorse setosis 2(rarissime 3)-aristatis, aristis 2.5–3 mm. longis retrorse barbatis, achaeniis exterioribus 5 mm. longis, interioribus 6 mm. longis.

Strictly glabrous and somewhat fleshy: stem erect, 1–4 dm. high, simple or branched; the branches strongly ascending: leaves oblanceolate; the lower subpetiolate; the middle and upper sessile, 0.5–1 dm. long, 6–13 mm. wide, remotely serrate, the teeth 3–10 on each side: heads erect: involucre turbinate-hemispherical; the outer foliaceous bracts strongly ascending, glabrous, linear-lanceolate, acute or sub-

acute, 1.5–4 cm. long; interior bracts oblong, subacute, yellow, brown-striate: pales narrowly oblong, yellow, obscurely pale-striate: achenes narrowly cuneate, flat, conspicuously about 9-striate on each side, retrorsely setose, 2(very rarely 3)-awned; the awns 2.5–3 mm. long, retrorsely barbed; outer achenes 5 mm. long, inner 6 mm. long.— MAINE: among sedges and rushes of a salt marsh, and at tide limit at edge of marsh, Winnegance Creek, Phippsburg, August 23, 1909, *Fernald & Wiegand* (*Fernald*, nos. 2248 & 2249 — TYPE in Herbarium of the New England Botanical Club); Cow Island, Topsham, August, 1910, *Kate Furbish;* bank of Androscoggin River, Brunswick, August 13, 1911, *C. H. Bissell.*

Bidens frondosa, as it ordinarily occurs, has the teeth of the leaves broadly deltoid, usually as broad at the base as the total length, and the foliaceous bracts of the involucre rarely twice as long as the inner bracts. Occasionally plants occur with more slender teeth or with longer outer bracts, but these two extreme tendencies are rarely if ever found in combination in the continental range of the species. In Newfoundland, however, the only indigenous colonies yet known of *B. frondosa* have the teeth of the leaves very narrowly lance-attenuate, and the foliaceous bracts 2.5–4 times as long as the inner involucre; and on Prince Edward Island and the Magdalen Islands this same combination of characters occurs in plants of the natural swales and marshes, indicating that in this area, at least, the species has departed sufficiently from its more general tendencies to merit the separation of a geographic variety,

B. FRONDOSA L., var. **stenodonta**, n. var., dentibus foliorum lanceolato-attenuatis, mediis 5–6 mm. longis; bracteis foliaceis involucri lanceolatis acuminatis plerumque 2.5–5 cm. longis.

Teeth of the leaves lance-attenuate; the median 5–6 mm. long: the foliaceous bracts of the involucre lanceolate, acuminate, usually 2.5–5 cm. long.— NEWFOUNDLAND, boggy open woods, Whitbourne, August 8, 1911, *Fernald & Wiegand*, no. 6375 (TYPE in Gray Herbarium); wet thickets, Norris Arm, August 21, 22, 1911, *Fernald & Wiegand*, no. 6376. QUEBEC: boggy margin of a brackish pond southwest of Étang du Nord village, Grindstone Island, Magdalen Islands, August 15, 1912, *Fernald, Long & St. John*, no. 8199. PRINCE EDWARD ISLAND: border of salt marsh, Bunbury, August 9, 1912, *Fernald, Long & St. John*, no. 8202.

In 1913 attention was directed to a peculiar plant of the Magdalen Islands which was then identified with *Bidens tripartita* L. of Eurasia and of the Gaspé Peninsula of Quebec, and to a variety of the Magdalen

Island plant common upon Prince Edward Island and characterized by having upwardly barbellate awns. The latter was then proposed as *Bidens tripartita*, var. *heterodoxa* Fernald.[1]

Subsequent collections and a more detailed study of the plants of Prince Edward Island and the Magdalens show that, although strongly simulating *Bidens tripartita* in foliage and in the flat usually 2-awned achene, the plant of these islands differs from that characteristic European species in having much smaller and copiously pubescent achenes and in having the outer foliaceous bracts of the involucre glabrous or at most very remotely ciliate toward the base. In *B. tripartita*, on the other hand, the much larger achenes are strictly glabrous and the outer involucral bracts conspicuously ciliate to the tip. The plant from the Gulf of St. Lawrence in its outer involucral bracts closely resembles the more southern, normally 4-awned *B. connata* Muhl., and occasional specimens with three or four awns tend to strengthen this similarity. In *B. connata*, however, the midribs of the two faces of the achene become strongly thickened at summit, thus giving to the top of the achene an obviously 4-angled appearance; and the surfaces of the achene are ordinarily quite glabrous or at most remotely setulose. In the plant of the Magdalen Islands and Prince Edward Island the copiously pubescent achenes are quite as flat as in *B. tripartita* and *B. comosa* (Gray) Wiegand. For this reason we feel justified in considering the insular plant a distinct species which is related on the one hand to *B. tripartita* (which is definitely known in North America only from the Gaspé Peninsula), on the other to the common continental species, *B. connata*.

B. **heterodoxa** (Fernald), n. comb. *B. tripartita* L., var. *heterodoxa* Fernald, Rhodora, xv. 76 (1913). Caule tenui glabro 1.5–9 dm. alto; foliis simplicibus vel 3–5-partitis utrinque glabris, imis tenuiter petiolatis, lamina vel loba terminali lanceolata vel anguste ovata 2.5–12 cm. longa argute grosseque serrata; capitulis discoideis vel radiatis; involucri bracteis foliaceis 3–6 lineari-lanceolatis elongatis, basi glabris vel sparse ciliatis, bracteis interioribus oblongis obtusis stramineis atro-striatis 7–9 mm. longis; paleis linearibus 4-striatis; achaeniis planis strigosis 2–4-aristatis margine aristisque sursum barbellatis, marginalibus cuneatis 4.5 mm. longis 1.8 mm. latis cum aristis 1.5 mm. longis coronatis, interioribus 6–7 mm. longis vix 2 mm. latis aristas 2–3 mm. longas gerentibus.

The stem slender, glabrous 1.5–9 dm. high: leaves simple or 3–5-parted, glabrous on both surfaces; the lower slender-petioled; blade

[1] Rhodora, xv. 76 (1913).

or terminal lobe lanceolate or narrowly ovate, 2.5–12 cm. long, sharply and coarsely serrate: heads discoid or radiate: involucre with 3–6 linear-lanceolate elongate foliaceous bracts, glabrous at base or sparsely ciliate; interior bracts oblong, obtuse, straw-colored, black-striped, 7–9 mm. long: pales linear, 4-striped: achenes flat, strigose, 2–4-awned, the margin and awns upwardly barbellate; marginal cuneate, 4.5 mm. long, 1.8 mm. wide, with awns 1.5 mm. long; interior 6–7 mm. long, scarcely 2 mm. wide, the awns 2–3 mm. long.— Besides the stations originally cited the following may be noted. PRINCE EDWARD ISLAND: border of fresh pond (recently an arm of the sea) back of sand hills, Tracadie, August 22, 1914, *Fernald & St. John*, no. 11,210 (radiate form). QUEBEC: sandy sea strand at the Narrows, Alright Island, Magdalen Islands, August 21, 1912, *Fernald, Long & St. John*, no. 8317 (broad leaved form with 4 awns).

B. HETERODOXA, var. **orthodoxa**, n. var., aristis achaeniorum retrorse setosis.

Awns of the achene retrorsely barbed.— QUEBEC: shallow water near the margins of brackish ponds, southwest of Étang du Nord village, Grindstone Island, Magdalen Islands, August 15, 1912, *Fernald, Long & St. John*, no. 8203 (TYPE in Gray Herbarium); boggy margin of strand at the Narrows, Alright Island, August 21, 1912, *Fernald, Long & St. John*, no. 8204.

In characteristic *Bidens connata* Muhl. the blades of the middle cauline leaves or the terminal lobes of the divided leaves have 10–20 sharp serrations on each margin, and the outer foliaceous bracts of the involucre are linear or linear-oblanceolate and inconspicuous, usually not more than 2 mm. broad and but slightly exceeding the inner involucre. On Block Island occurs a characteristic extreme in which the primary leaves are coarsely and irregularly dentate with 5–10 teeth on each margin and with the outer foliaceous bracts as large as in *B. comosa* (Gray) Wiegand, usually oblanceolate, the larger 3–6 cm. long and 0.5–1.5 cm. broad. A plant quite identical with this Block Island extreme has been collected by Mr. E. F. Williams at Lake Massapoag in Sharon, Massachusetts, indicating that the plant is of somewhat wide distribution in southern New England. This extreme plant with achenes as in *B. connata*, but with foliage and involucre similar to those of *B. comosa* may be called

B. CONNATA Muhl., var. **fultior**, n. var., foliis primariis laminis vel lobis terminalibus grosse inaequaliterque dentatis, dentibus utrinque 5–10; involucri bracteis foliaceis oblanceolatis, majoribus 3–6 cm. longis 0.5–1.5 cm. latis; aristis achaeniorum 4–6.— MASSACHUSETTS: Lake Massapoag, Sharon, September 10, 1899, *E. F. Williams*. RHODE

ISLAND: sandy pond-margins, east of Dickens Point, Block Island, September 15, 1913, *Fernald, Long & Torrey*, no. 10,688 (TYPE in Gray Herbarium).

Bidens cernua L. as it occurs in eastern America is highly variable and especially so in its foliage. Besides the typical form of the species with elongate-lanceolate or linear-lanceolate leaves with many coarse serrations, we get the dwarf bog plant, var. *minima* (Huds.) DC., with tiny, spatulate or oblanceolate petioled leaves and usually solitary campanulate heads; and the very large varieties with broader copiously serrate leaves, varieties *elliptica* and *integra* of Wiegand. On the brackish sands of the Magdalen Islands and Prince Edward Island occurs a depressed or matted, freely branching plant with the heads and achenes and the hispid stems of *B. cernua*. The small, fleshy leaves, however, are mostly obtuse and with few and obscure dentations, and the outer fleshy bracts of the involucre are oblong or broadly oblanceolate and much exceeding the inner series. This little plant, though first noted in maritime sands, does not seem to be restricted to brackish habitats, for identical material has been collected on the sandy shore of a pond in Coös County, New Hampshire, and an old specimen of Gray's from western New York is probably not separable. This extreme variation may be called

B. CERNUA L., var. **oligodonta**, n. var., humilis plus minusve depressa ramosissima 0.5–2 dm. alta; caulibus glabris vel sparse hispidis; foliis crassis rhomboideis vel elliptico-oblanceolatis obtusis ad basim angustatis subintegris vel pauce dentatis, dentibus utrinque 1–5 obtusis, foliis primariis 2–5 cm. longis 0.5–1.5 cm. latis; capitulis hemisphaericis 0.5–1 cm. latis; bracteis foliaceis oblongis vel late oblanceolatis obtusis plerumque 1.5–2 cm. longis.— QUEBEC: peaty margin of a brackish pond southwest of Étang du Nord wharf, Grindstone Island, Magdalen Islands, August 22, 1912, *Fernald, Long & St. John*, no. 8208 (TYPE in Gray Herbarium). PRINCE EDWARD ISLAND: wet brackish sand, North Lake, Kings County, August 24, 1912, *Fernald, Long & St. John*, no. 8209. NEW HAMPSHIRE: sandy shore, Success Pond, Coös County, August 27, 1907, *A. S. Pease*, no. 10,738. NEW YORK: western section, *Gray*.

III. AN INSULAR VARIETY OF SOLIDAGO SEMPERVIRENS.

HAROLD ST. JOHN.

Our common Seaside Golden-rod, *Solidago sempervirens*, was described by Linnaeus in 1753.[1] His brief characterization applies well to the plant of our northern Atlantic coast, known by him to occur in Canada and New York. He mentioned the "corymbose-panicled flowers," and the "lanceolate, subfleshy, glabrous, but slightly scabrous-margined leaves." His sources of information were: Gron. virg. 97; Corn. canad. 168; Herm. flor. 26; Moris. hist. 3. p. 124. f. 7. t. 23. f. 15; Pluk. alm. 389. t. 235. f. 5.

Of these the work of Jaques Cornut is the earliest and his description and full-page plate are by far the clearest. As the greater part of the description by Linnaeus was drawn from Cornut, we can safely turn to this fuller definition for more points about the species which Linnaeus characterized under the new name *sempervirens*.

Cornut's plate shows several sparsely branched stems arising from the rootstock. The radical leaves are wanting, the cauline are subsessile, lanceolate, tapering equally to either end and gradually diminishing in size to the base of or into the inflorescence, which is a loose panicle.

If we turn to the dried specimens in the Gray Herbarium and that of the New England Botanical Club we find *Solidago sempervirens* well matching Cornut's plate from the shores of the Gulf of St. Lawrence and along the coast to New Jersey, and less commonly to Florida. Along the southern part of our coast, from New Jersey southward, *S. sempervirens* is usually displaced by *S. stricta* Ait. and its variety *angustifolia* (Ell.) Gray.

In the Botany of California [2] Gray credits *S. sempervirens* to the Pacific coast, characterizing it in these words: "Leaves rather fleshy, lanceolate, entire, the uppermost reduced to subulate bracts of the virgate and rather dense panicle,.... Salt marshes near San Francisco, *Bolander*. Near the southern boundary, 60 miles east of San Diego, *Palmer*. Appears to be the same as the Salt-Marsh

[1] L. Sp. Pl. ii. 878 (1753).
[2] Bot. Calif. i. 319 (1876).

Goldenrod of the whole Atlantic shore down to Mexico. It is a form with small heads (3 lines long), approaching *S. angustifolia* of Elliott."

The interpretation that the plant of the Pacific coast is *S. sempervirens* has now become traditional,[1] but the descriptions of the plant seem to tally exactly with that of *S. confinis* Gray.[2] This species is separated from *S. sempervirens* on the character, "rays small, not surpassing the disc flowers." In *S. confinis* as in *S. sempervirens* the cauline leaves are divergent, gradually diminishing upward, but the leaves of the former are much narrower, being linear or lance-linear in outline. In the discussion following the description of *S. confinis* Gray cites one of the records he had formerly given for *S. sempervirens* in California: "*S. sempervirens*, Gray, Bot. Calif. i. 319, as to coll. Palmer." The other sheet cited by Gray in the Botany of California: "*Solidago sempervirens* L. Marsh, San Francisco, California, *H. N. Bolander*, 2249, 1866/7," seems to be typical of the plants since described as *S. sempervirens* in Behr's, Greene's, and Jepson's works. This plant is also *S. confinis*. From this it appears that the presence of *S. sempervirens* on the Pacific coast of North America has yet to be demonstrated.

Among the numerous names reduced by Gray [3] to synonyms of *S. sempervirens* L. is *S. azorica* Hochst.[4] In its flower and fruit characters this plant of the Azores is inseparable from *S. sempervirens* L. but the cauline leaves, on the other hand, are strikingly different in outline. They are sessile, ovate or deltoid-lanceolate, broadest just above the base, and tapering gradually into the blunt, attenuate tip. This may be recognized as

SOLIDAGO SEMPERVIRENS L., var. **azorica** (Hochst.), n. comb. *S. azorica* Hochst. in Seubert, Fl. Azorica, 31, t. X (1844).

Contrasting with this the North American *S. sempervirens* has the cauline leaves linear to broadly lanceolate, widest near the middle and tapering equally to either end.

[1] Behr, Fl. Vicin. San Francisco, 85 (1888); Greene, Flora Franciscana, 373 (1897); and Jepson, Fl. W. and Middle Calif. 476 (1911).

[2] Gray, Syn. Fl. N. Am. i. pt. 2, 149 (1884).

[3] Gray, Proc. Am. Acad. xvi. 192 (1882).

[4] Hochst. in Seub. Fl. Azorica, 31, t. x (1844).

MONESES UNIFLORA VAR. RETICULATA.

S. F. BLAKE.

MONESES UNIFLORA (L.) Gray var. **reticulata** (Nutt.), n. comb.—In the recent revision of North American *Pyrolaceae* by Rydberg in the North American Flora (xxix. pt. 1, 29–30 (31 Aug. 1914)) Nuttall's *Moneses reticulata* (Trans. Am. Phil. Soc. ser. 2. viii. 271 (1843)) is retained as a species, a rank which in the writer's opinion is not justified by the slender distinctions separating it from *M. uniflora.* It was originally described as: "MONESES* *reticulata;* leaves roundish-ovate, dentate, reticulately and prominently veined; calyx ciliate; anthers as long as the filaments. *Pyrola uniflora.* Hooker, Flor. Bor. Am. (in part.) 2. p. 45. HAB. Shady fir woods of the Oregon, not far from the sea. Nearly allied to *M. grandiflora* DECAND; but the leaves are strongly toothed, with elevated reticulations." The differential characters which may be sifted from the descriptions in the North American Flora are: of *M. uniflora*: "leaf-blades orbicular or rounded-oval, usually rounded at the apex, acute at the base, 1–2 cm. long, crenate, not strongly veined; . . . .sepals ovate . . .; anthers 2–2.5 mm. long, about half as long as the filaments; . . . capsule 7–8 mm. in diameter." Of *M. reticulata:* "leaf-blades rounded-ovate, usually acute, 1–2.5 cm. long, rather coarsely dentate and strongly veiny . . .; sepals oval . . .; anthers nearly 3 mm. long, slightly shorter than the filaments; . . . capsule about 1 cm. in diameter."

Neither the alleged difference in sepals nor that in anthers and filaments is supported by the material examined (that in the British Museum, including the types of *M. reticulata*). *M. reticulata* has oval sepals, to be sure, but so have the great majority of specimens of *M. uniflora* from Europe and America, for example one from Massachusetts collected by Nuttall himself. The general type of sepal in *Moneses* is oval, varying slightly in breadth and sometimes with a slight tendency to ovate, but certainly never to be split into "oval" and "ovate" in accordance with any geographic lines. The anthers, which were said by Nuttall to be as long as the filaments, are described by Rydberg as "slightly shorter than the filaments." In Nuttall's types of *M. reticulata* they are in reality about half the length of the filaments, measuring 2.5 mm. in length, and are in no way different

from those of *M. uniflora* (in European material of which they measure from 1.8–3.1 mm. in length). Nor are the larger fruits ascribed to *M. reticulata* shown by the specimens examined, for these have capsules only 6–6.5 mm. in diameter, smaller than the minimum given by Rydberg for *M. uniflora.* Furthermore the reticulated venation so apparent in *M. reticulata* is by no means confined to it, but occurs frequently in specimens from both Europe and America which can only be referred to *M. uniflora.* Since *M. reticulata* can only be distinguished from *M. uniflora* by its more ovate less orbicular acute or acutish leaves serrate-dentate rather than crenate, characters by no means constant, the plant seems better treated as a variety than as a species. I have seen specimens (in the British Museum) of *M. uniflora* (L.) Gray var. *reticulata* (Nutt.) Blake from the following localities: ALASKA: Sitka, *Bongard;* BRITISH COLUMBIA: Banks Island, *Menzies;* Observatory Inlet, *Scouler* 52; Vancouver Island, district of Renfrew, 1902, *Rosendahl* 876; near Emerald Lake, alt. 1336 m., 1904, *Heacock* (*Shaw* 87a); Roger Pass, alt. 1372 m., 1904, *J. Macmillan* (*Shaw* 476); Howser Lake, alt. 762 m., 19 June 1905, *Shaw* 724a; WASHINGTON: upper valley of the Nesqually, Cascade Mts., 16 June 1894, *O. D. Allen* 67; OREGON: dark woods of the Columbia, *Nuttall* (TYPES); CALIFORNIA: near Mt. Shasta, July, *Lemmon Herbarium.*

LONDON, ENGLAND.

WEEDS GROWING IN AMHERST.

W. J. BEAL.

THREE years ago I bought a little over an acre of land from the back end of the Brigham Farm fronting on the north side of Amity Street. Later Sunset Avenue was extended along the front on the east of the lot referred to. I built a house and seeded to grass the east half and occupied the house during the years 1913 and 1914.

In this time I have identified one hundred and nineteen species of weeds growing in the lawn, and on extending my search for about a block beyond this area I have added eleven others, making one hundred and thirty in all.

I give here the names of those not enumerated in Professor George E. Stone's recently published List of Plants, growing without cultivation in Franklin, Hampshire, and Hamden Counties, Massachusetts.

Bromus hordeaceus L.
Rumex Mexicanus Meisn.
Thlaspi arvense L.
Camelina microcarpa Andrz.
Brassica arvensis (L.) Ktze.
Sisymbrium altissimum L.
" *incisum* Engelm.
Euphorbia humistrata Engelm.
" *hirsuta* (Torr.) Wiegand.
Solanum rostratum Dunal.
Anthemis tinctoria L.

The following have been found in one or more places in the counties covered by Professor Stone's List, but do not appear to have been recorded until now from Amherst.

Conringia orientalis (L.) Dumort.
Potentilla recta L.
Geranium pusillum Burm.
Datura Tatula L.
Specularia perfoliata (L.) A. DC.
Ambrosia trifida integrifolia (Muhl.) T. & G.
Galinsoga parviflora Cav.
Crepis capillaris (L.) Wallr.

AMHERST, MASSACHUSETTS.

A RASH MYCOPHAGIST.

HOLLIS WEBSTER.

THE alarming experience of a New Englander transplanted to the Mississippi Valley may be cited as a warning to eaters of mushrooms never to depart from the one safe and dependable rule: Eat only what you know is good to eat.

In New England, as elsewhere, the cosmopolitan species *Lepiota procera*, Parasol Mushroom, is familiar. Figures of it are conspicu-

ous in all popular books on edible mushrooms, no matter in what language they are written, or in what country published. Everywhere, among the knowing, this tall brown columnar-stemmed, scurfy-capped toad-stool of grass land is hunted, gathered, cooked and duly consumed. With its white spores, free gills, ring and volva-less base it is typical of the genus Lepiota, a genus which includes other species of the same harmless nature, and, to many, attractive flavor, such as *L. Americana, L. rhacodes* and *L. naucina.* Indeed the conclusion is all too frequent that any toad-stool with the same botanical characteristics, any Lepiota, is safe to eat. In New England experience would seem to show that it is not unsafe to assume this with regard to any of the species here found.

In this case, however, a man whose experience was gathered during some years in New England changed his residence to Missouri. There in early September last a large Lepiota resembling *L. procera,* attracted attention and was gathered for the table. Its difference from the familiar species was recognized. Nevertheless, as all Lepiotas were thought to be edible, the collector ate one, and then he and others made a supper of them. In two hours several of the party were made violently ill, and until they recovered there was suspense and alarm, for it is no slight thing to be poisoned by a mushroom, when you are ignorant of the degree of virulence of the poison.

What we know of the innocent or noxious qualities of mushrooms is largely empirical, and as regards the individual mycophagist is for the most part based on tradition and personal instruction and example. A few cautiously experiment like Professor Peck of Albany, or Mr. MacIlvaine — him of the big book — with first a taste, then a mouthful, then, if undeterred, a courageous, trustful meal. And thus is extended the list of toadstools that man has eaten, and which, presumably, man may eat again.

In recent years some researches have been made in scientific laboratories upon the chemistry and physiological action of mushroom toxins. Among such may be cited these of W. W. Ford [1] of Johns Hopkins University. The results of these researches confirms in the main popular experience and tradition.

But what was the toadstool that the unfortunate New Englander ate? Judging from material preserved, it was probably *Lepiota*

[1] See, for summary and bibliography, Ford and Clark: "A Consideration of the Properties of Poisonous Fungi," Mycologia, Vol. VI. No. 4, July, 1914.

Mongaric, a species of the middle s .ates, which is a Lepiota in everything but its spores. These are greenish. It is a species known only since the comparatively recent development of the knowledge of American fleshy fungi, that is to say since the beginning of the studies of Professor Peck. It is one of the hundreds of species named and described by him. It ha, already made its mark among mycophagists. Some have eaten it with impunity, others have eaten it and repented, others have urged friends or relatives to eat it and have been plunged in terrifying remorse. It is a fungus which like strawberries or fish seems to be a test of a certain gastronomic idiosyncrasy, and which bears out the saying that what is one man's meat is another man's poison.[1]

TWO MORE FOREIGN PLANTS FOUND ON WOOL-WASTE AT WESTFORD. — In May and June, 1914, I made my usual yearly visits to the dumps on some farms near here where the waste from the woolen mills is used as a fertilizer. I found only two plants which were new to me. These were later determined for me at the Gray Herbarium by Dr. B. L. Robinson and Mr. G. S. Torrey, and proved to be *Chorispora tenella* (Pall.) DC. and *Trifolium echinatum* Bieb. The former, of which I found only two plants, is an annual crucifer with purplish flowers. It is a native of southern Russia and central Asia. The *Trifolium* has pink-tinted white flowers, and the heads develop into burs with many firm sharp prickles. I found only two plants of this clover and they were prostrate forming a circular mat. The species grows as a native in southern Europe and Asia Minor. No record has been found of either of these plants in this country.— EMILY F. FLETCHER, Westford, Massachusetts.

[1] See also Chestnut: "Poisonous Properties of the Green-spored Lepiota," Asa Gray Bull., Vol. VIII, No. 5, Oct. 1900.

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NOVEMBER FLOWERS.

Frank S. Collins.

In records of seasonal occurrence, it will be found that more attention has been given to the beginning than to the end of the season. The finding of the first flower of the year of any species, the first hearing of the song of some bird, is an inspiring event, but after we have seen one and heard the other for months, the closing record is less interesting. Again, the latter is more difficult to obtain, and to be sure of the date of the fading of the last flower, the departure of the last bird of a species, is impossible. When you gather your first Hepatica, hear your first bluebird, you can make your record, and that is all there is to be done about it; but if you see a wild rose on the first of November, you must continue to watch for wild roses all through the month, and then feel that there were probably some that you did not see. But though no final date can be given with certainty, a list of species observed in some period at the close of the season, may show some interesting details. A list of this kind was made by the late Bradford Torrey, and will be found in his volume of pleasant and at the same time accurate nature studies, A Rambler's Lease, published in 1890. It appeared previously like most of the other essays in the volume in the Atlantic Monthly. It gives a list of plants that he found in bloom in the open in November, 1888, as also notes on butterflies and birds observed during the month. I have often thought that it would be interesting to compare a similar list of flowers in November of some other year, and see in what proportion the species were the same. I had been unable to make up such a list, as in the case of a man whose occupation demands a day's work every week day, while

he can in the spring welcome the coming guest before and after the time when the whistle blows, literally or metaphorically, there is no daylight for speeding the parting guest in the autumn. Once, on November 4, 1900, when riding on my bicycle from Malden to Revere Beach and back, I made note of the flowers I saw in bloom, conspicuous enough to be visible as I went by; there were 22, not counting two manifestly different "mustards" that I did not recognize specifically.

In November, 1913, for the first time I was able to give some daytime, every day, to making notes of this kind, and the present paper is the result of these notes, and similar ones in November, 1914, in the town of Eastham, Barnstable County, Massachusetts. In each year I was away from Eastham part of the month; in 1913 the observations cover the period from the seventeenth to the thirtieth, in 1914 from the first to the twentieth. Mr. Torrey records finding some species only in a single limited station, and it is of course probable that similar stations for other species were overlooked, both in his case and in mine; completeness in such matters is impossible. Mr. Torrey's list is given by common names, "omitting Latin titles,— somewhat unwillingly, I confess —" he says, but I think I have rightly identified all the species except one, "common blue violet"; one looks back with a mild melancholy to the good times, now gone forever, when there was such a thing as the "common blue violet."

In the following tabulation all the species observed by Mr. Torrey and myself are in a single list, in the order of the Manual Check List; there are four vertical columns at the right; a check in the first indicates the presence of the species in Mr. Torrey's November, 1888 list; in the second column, its occurrence in November, 1913; in the third, its occurrence in November, 1914; in the fourth column are indicated the species that were able, by the unusually mild weather of the close of 1913, to continue blooming into December of that year.

	Nov. '88	Nov. '13	Nov. '14	Dec. '13
Spiranthes cernua	+			
Polygonella articulata	+		+	
Polygonum aviculare	+	+	+	
Polygonum Persicaria			+	
† Chenopodium carinatum			+	
Phytolacca decandra			+	

	Nov. '88	Nov. '13	Nov. '14	Dec. '13
Scleranthus annuus	+	+	+	+
Mollugo verticillata			+	
Cerastium vulgatum	+		+	
Dianthus Armeria	+			
Saponaria officinalis			+	
Spergula arvensis		+	+	+
Spergularia rubra	+		+	
Stellaria media	+			
Delphinium Consolida	+			
Ranunculus acris	+	+		
Ranunculus repens	+			
Chelidonium majus	+			
* Corydalis sempervirens	+			
Brassica arvensis		+	+	+
Brassica Napus		+	+	
Cakile edentula	+		+	
Capsella Bursa-pastoris	+	+	+	+
Lepidium virginicum	+	+	+	+
Raphanus Raphanistrum	+			
Sisymbrium altissimum			+	
Sisymbrium officinale var. leiocarpum	+			
* Hamamelis virginica	+			
* Geum canadense	+			
Potentilla argentea	+		+	
Potentilla canadensis	+			
Rosa virginiana			+	
Baptisia tinctoria			+	
Medicago lupulina	+			
* Melilotus alba	+			
Trifolium hybridum	+		+	
Trifolium pratense	+	+	+	+
Trifolium repens	+			
Erodium cicutarium	+	+	+	+
* Geranium Robertianum	+			
Malva rotundifolia	+	+	+	+
* Viola pedata	+			
* Viola tricolor	+			
Oenothera muricata	+		+	
* Oenothera pumila	+			
Daucus Carota	+		+	
Limonium carolinianum			+	
Anagallis arvensis			+	
* Gentiana crinita	+			
Leonurus cardiaca	+		+	

	Nov. '88	Nov. '13	Nov. '14	Dec. '13
Prunella vulgaris	+			
Linaria canadensis	+	+	+	+
Linaria vulgaris	+		+	
* Campanula rapunculoides	+			
Achillea Millefolium	+	+	+	+
Ambrosia artemisiifolia			+	
Anaphalis margaritacea	+			
Antennaria plantaginifolia	+			
Anthemis Cotula	+		+	
Arctium minus	+			
* Aster cordifolius	+			
* Aster divaricatus	+			
* Aster lateriflorus	+			
Aster ericoides		+	+	+
Aster linariifolius	+		+	
* Aster multiflorus	+			
Aster novi-belgii	+		+	
Aster patens		+	+	
* Aster puniceus	+			
* Aster vimineus	+			
* Aster undulatus	+			
Chrysanthemum Leucanthemum var. pinnatifidum		+	+	
† Chrysopsis falcata		+	+	+
Cirsium arvense	+			
Cirsium discolor		+	+	
Erigeron canadensis	+		+	
Erigeron ramosus	+		+	
Gnaphalium polycephalum	+	+	+	
Leontodon autumnalis	+		+	
Rudbeckia hirta	+			
Senecio vulgaris	+	+	+	+
Solidago bicolor	+			
* Solidago caesia	+			
* Solidago canadensis	+			
* Solidago juncea	+			
Solidago nemoralis	+	+	+	+
Solidago rugosa	+			
Solidago sempervirens	+	+	+	
Sonchus asper			+	
Sonchus oleraceus	+			
Tanacetum vulgare	+			
Taraxacum officinale	+		+	

The 92 species in the list represent 26 families; *Compositae* with 38 species, *Cruciferae* with 8, *Caryophyllaceae* with 6, *Leguminosae* with 5, *Rosaceae* with 4, no other with more than 3. The *Compositae* are especially a family of autumn plants with us, and their predominance is not unnatural, though the extreme predominance may be somewhat surprising, 41 per cent, against 13 per cent of the flowering plants in Gray's Manual. The monocotyledons have only one species, the trees one species; both these in the Torrey list, neither in mine. Of the 92 species, 40 are introduced, being 43 per cent; if we exclude the *Compositae* with the asters and golden rods, all native, 55 per cent are introduced species; only 17 per cent of the flowering plants in the Manual are introduced. Two reasons may be suggested for their predominance; immigrants that have established themselves probably represent the few hardy and persistent species among the many that have at some time or other landed on our shores, and perhaps taken out their first papers, but never secured citizenship. Many of these species come from lands where the season of vegetation is longer than with us; they have not completed what would be their normal period at home at a time when native plants are quite through for the year. Two plants have seemed to me good instances of this latter condition; *Senecio vulgaris* and *Erodium cicutarium*. Little is seen of either at midsummer, but they are conspicuous in early spring and late autumn; and at any time through the winter a few warm days will bring them out.

Some of my species are in the list on single observations, and Mr. Torrey notes the same as to some of his; but with others, the case was different; they came not as spies, but whole battalions. *Aster ericoides*, which Mr. Torrey did not see at all, was very abundant in Eastham the first part of November; I saw fields showing white with it at quite a distance. Large plants of *Cirsium discolor* were frequent, mostly out of bloom and even the seeds gone, but still a few perfect heads on each, and here and there an individual quite in full bloom. Three times I saw *Rosa virginiana*, only a single flower each time, but that as perfect as in June. Two plants in Mr. Torrey's list, *Viola pedata* and *Antennaria plantaginifolia*, may be considered as precocious rather than belated, none in my list.

Mr. Torrey's list had Wellesley for a center, but covered quite an area; six species, he states, he did not collect himself, but they were contributed by a friend whose collecting extended into Essex County.

Two, *Delphinium Consolida* and *Viola tricolor*, were manifestly garden escapes. My own list covers Eastham only, about seven square miles. His list covers a much greater area in a more fertile region; as a slight offset may be reckoned that the climate at Eastham is milder than that at Boston; in the autumn of 1914 the Dahlias here were in excellent condition after those at Boston, and even on the Buzzard's Bay shore of the Cape, were destroyed by the frost. In the list I have put a star (*) at the left of the name in each case where a species reported by him is not to be expected in my region, and a dagger (†) to indicate the reverse. Of these species, it will be seen, there are twenty and two respectively. This leaves seventy species that might be expected in both regions; of these he found twenty-one that I did not, I found eighteen that he did not; thirty-one species we both found, a sufficiently large proportion, it seems to me, to show that certain species have the capacity to continue flowering as long as weather conditions permit, while others, whose flowering season begins no earlier, have a definite time for getting through, with little regard to conditions of temperature. No grasses were included in Mr. Torrey's list and I do not know whether he noticed grasses. I found three species, one native and two introduced; *Spartina patens*, *Bromus tectorum* and *B. hordeaceus* were in flower in Eastham in November, 1914.

That these lists are by no means complete may be judged from the fact that in going over my "bicycle" list, referred to above, I find that I noticed three species that do not appear in the table I have given; *Trifolium arvense*, *Cichorium Intybus* and *Artemisia caudata*. If lists could be made out for other localities, a comparison might lead to definite conclusions; it is to be hoped that the opportunity may come to some readers of Rhodora, and be improved by them.

North Eastham, Massachusetts.

THREE OF CLAYTON'S OAKS IN THE BRITISH MUSEUM.

C. S. Sargent.

A visit a few months ago to the region in Gloucester County, Virginia, where John Clayton lived for many years, led me to examine last summer the specimens of Oaks collected by him and preserved in the British Museum. Three of these specimens are of some interest.

1. Clayton's Quercus rubra seu Hispanica hic dicta, foliis amplis varie profundeque incisis was described by Gronovius as Quercus foliorum sinubus obtusis, angulis lanceolatis seta terminatis integerrimis vix divisis. This is the first synonym quoted by Linnaeus under his description of *Quercus rubra* in the Species Plantarum and that on which his diagnostic phrase was based. The other synonym quoted by Linnaeus and by Gronovius is Quercus esculi divisura, foliis amplioribus aculeatis of Plukenet & Catesby. Plukenet's figure of a single leaf might possibly pass for a leaf of the Red Oak, although it looks more like some form of *Q. coccinea* or of *Q. velutina*. Catesby's plate well represents *Q. falcata*, although a single unattached and uncolored fruit on this plate might represent a small fruit of *Quercus rubra*. Catesby calls his Oak the Red Oak. In the southern states *Quercus falcata* is always called Red Oak, and if the name Spanish Oak is ever used for it this name is not common. Clayton's specimen is clearly the digitate form of *Quercus falcata*. Linnaeus's description of his *Quercus rubra*, "Q. foliis obtuse-sinuatis, setaceo-mucronatis," means little and might apply to several species as well as to *Q. rubra*, and if his species was based on the descriptions of earlier authors *Q. rubra* should be the name of the tree now called *Q. falcata* or *Q. digitata*. Linnaeus's *Q. rubra* β in the Species Plantarum, judging by the figures of Catesby & Plukenet quoted by him, although they represent only single leaves, was probably what we now call *Quercus rubra*.

2. This is a specimen of a single leaf of *Quercus velutina*, under which is written "Quercus foliorum, sinubus obtusis, angulis lanceolatis seta terminatis integerrimis vix divisis, Fl. Virg. p. 117, our common black Oak, Bartram.

Quercus foliis obtuse sinuatis setaceo-mucronatis, Linn. Syst. gen. 949, n. 9."

Clayton's description was not quoted by Linnaeus and Clayton's

specimen may not have been collected before 1753. Clayton, confounding two species, referred his specimen of the Black Oak to the species which Linnaeus called *Q. rubra* in the Species Plantarum and in the tenth edition of the Systema Naturae.

3. Clayton's Quercus Castaneae foliis, glandibus maximis is a flowering specimen with leaves nearly one-third grown. The long petioles and the serrature of the leaves show that it is *Quercus Muehlenbergii*. Two Chestnut Oaks naturally grow in Gloucester County, where *Q. Michauxii* is the more common of the two. I saw only a few trees of *Q. Muehlenbergii* and only one individual of *Q. Prinus*, a very large tree growing in the grounds of an old colonial estate where it had probably been planted. Clayton evidently confounded two species as his "glandibus maximis" must have belonged to *Q. Michauxii*, and it is probable that two and perhaps three Chestnut Oaks are included in Linnaeus's *Quercus Prinus*. "Denticulis rotundatis uniformibus" in his description would apply to *Q. Prinus* and *Q. Michauxii*. Plukenet's figure quoted by Linnaeus represents a single leaf which might belong to either *Q. Prinus* or *Q. Michauxii*, but Catesby's full-page plate and his description also quoted by Linnaeus clearly represent *Q. Michauxii*. It seems necessary therefore to restore the name *Q. Prinus* L. to the tree now called *Q. Michauxii* Nutt. and adopt again for the Rock Chestnut Oak the name of *Q. montana* Willd., the name used for this tree by Pursh and by Gray in all editions of his Manual published during his life and by other authors until Engelmann selected the Rock Chestnut Oak as the type of *Q. Prinus* on the mistaken idea that it was the common Chestnut Oak of Virginia, meaning by Virginia, of course, that part of the state in which the early botanists collected. *Quercus Prinus* is an Appalachian tree and rarely grows near the coast, and it is *Q. Michauxii* which would have attracted the attention of Banister, Clayton and Catesby who worked chiefly in the coast region.

Photographs of these three specimens of Clayton may be seen in the Herbarium of the Arboretum.

ARNOLD ARBORETUM.

SYSTEMATIC STUDIES ON OENOTHERA,—V.

OE. ROBINSONII AND OE. CLEISTANTHA, SPP. NOVV.

Harley Harris Bartlett.

(Plate 111.)

It has been shown [1] that "*Oenothera cruciata*" of the Manuals is an aggregate of genetically unrelated elements with little morphological similarity aside from their linear petals. A number of these elements have been separately defined, namely, *Oe. cruciata* Nutt., *Oe. venosa* Shull & Bartlett, *Oe. atrovirens* Shull & Bartlett, and *Oe. stenomeres* Bartlett. Moreover, Bicknell [2] has described a cruciate-flowered ally of *Oe. Oakesiana*, *Oe. stenopetala* Bicknell, thus greatly strengthening the evidence that the character of cruciateness has originated independently in several lines of descent.

In this article two more cruciate species are proposed, *Oe. Robinsonii* and *Oe. cleistantha*. The former has figured somewhat in genetical literature as an "elementary species of *Oe. cruciata*." It was originally collected by Robinson in 1902 at Jaffrey, New Hampshire, and sent to de Vries. For several years prior to 1913 the strain had been lost from the experiment gardens, but Dr. Robinson very kindly collected it again at Jaffrey and sent seeds to the writer. These were planted last year, and gave a uniform culture of very slender-flowered plants which agree with all that we know of the strain originally cultivated by de Vries.

There has been some confusion in the literature between *Oe. Robinsonii* and a form described by MacDougal which originated from seeds collected at Hudson Falls (Sandy Hills), New York, the type locality of *Oe. venosa* and *Oe. atrovirens*. Since my former article on the cruciate forms (l. c.) was published, I have received numerous seed collections from Mr. Stewart Henry Burnham, of Hudson Falls, which may make it possible to clear up this confusion as well as to determine whether *Oe. venosa* and *Oe. atrovirens* respectively are more closely

[1] Bartlett, H. H. An account of the cruciate-flowered Oenotheras of the subgenus Onagra. Am. Journ. Bot. I (1914) pp. 226–243.

[2] Bicknell, E. P. The ferns and flowering plants of Nantucket — XII. Bull. Torr. Bot. Club, XLI (1914) pp. 71–87.

allied to broad-petaled species of that region than they are to one another. Mr. Burnham was the original collector of *Oe. venosa* and *Oe. atrovirens* and obtained the seeds through which these species were introduced into our experiment gardens. The new seed collections are from the same locality as those of 1903. Since Mr. Burnham has sent entire inflorescences it seems safe to say, even before the seeds are planted, that *Oe. Robinsonii* is not among the forms which he has collected. Nevertheless, there is enough likeness between *Oe. venosa* and *Oe. Robinsonii* so that a close genetic relationship between them seems not unlikely.

Oenothera cleistantha was collected about ten years ago at Huntington, Long Island, by Dr. Geo. Harrison Shull. He has grown it extensively for experimental purposes, and the writer has also had it under observation during one season. Unlike *Oe. Robinsonii*, it has no obvious affinity with any Onagra thus far described, either cruciate or broad-petaled. In general appearance it is more similar to the *Oe. venosa* of northern New York than to the *Oe. stenomeres* of Maryland, but genetically it is probably not closely related to either.

Oenothera Robinsonii Bartlett sp. nov. Biennis. Rosula matura ca. 50 cm. diametro; foliis maximis 30 × 4 cm., mediocribus 20–25 × 3.5 cm., viridibus, longe petiolatis, spatulato-lanceolatis, modice bullatis, ad basin versus argute dentatis, utrinque exigue pubescentibus; pilis brevibus appressis. Planta matura ca. 60 cm. alta. Caulis proprius sursum ramos floriferos deorsum ramos abortivos ferens. Rami radicales numerosi (10–20) cauli proprio similes. Caules latere insolito rubri, altrorsus maculosi, tuberculato-pilosi, pilis ascendentibus, tuberculis cauli concoloribus. Folia inferiora caulina eis rosulae similia, ca. 13 × 3 cm., media ca. 10 × 2.2 cm. Bracteae foliaceae, persistentes, ovariis longiores sed fructibus maturis plerumque breviores, anguste lanceolatae, minute puberulae, supra pilis aliis acutis, aliis viscidis cylindricis, apice rotundatis, subtus viscidis solis vestitae. Hypanthium gracillimum 33–40 mm. longum, 1.5 mm. crassum, pilis aliis paucissimis mediocribus ascendentibus, aliis numerosis brevibus erectis viscidis tectum. Calyx proprius pubescentia hypanthio similis, inexpansus gemmam prismaticam quadrangulam 15 mm. longam 3.5 mm. crassam formans, apicibus liberis 3 mm. longis, paulum infraterminalibus, erectis, parallelis, sparsim appresso-pubescentibus. Petala margine viridi-flavescentia, medio flava, staminibus breviora, 8 mm. longa, 2 mm. lata, supra glabra, subtus sparsissime viscido-puberula. Stigma antheris 5–6 mm. longis circumdatum. Ovarium 10 mm. longum gracillimum, pilis et longis ascendentibus rubro- vel viridi-tuberculatis et brevibus erectis densis viscidis tectum. Fructus 26 mm. longi, prope basin 6 mm. crassi,

apicem versus sensim angustati, minute viscido-puberuli, pubescentes, et sparsim tuberculato-pilosi, tuberculis viridibus; apicibus productis brevissimis truncatis vel paululo emarginatis.— Cultivated from seeds collected at Jaffrey, New Hampshire, by B. L. Robinson; garden specimens, *Bartlett* 3505, 3509, 3517, 3669, 3670. *Oe. Robinsonii* differs from *Oe. venosa* chiefly in the smaller size of the former, in the more sharply dentate leaves, the narrower bracts, the dense erect viscid puberulence of the longer, more slender buds and the shorter calyx tips. Most of these differences are obscure in herbarium material. The range of variation in bud length, for example, overlaps in the two species. Nevertheless the difference is striking enough in plants cultivated under identical conditions, as were those shown in Plate 111.

Oenothera cleistantha Shull & Bartlett sp. nov. Biennis. Rosulae folia oblanceolata, ad petiolum versus distanter et acute sinuato-dentata, maxima ca. 270 × 30 mm. Planta matura ca. 1 m. alta ex caule proprio obliquo et 10–15 ramis radicalibus constans. Caulis proprius infra inflorescentiam ca. 7 dm. longus, dense foliosus et ramosus, ramis 5–100 mm. longis, solum longioribus autumno vergente floriferis; inflorescentia terminalis 3–4 dm. longa, sublaxa, simplex vel spicis 1–4 lateralibus brevibus praedita, juventate paululo nutans, aetate erecta. Rami radicales late patentes, caule proprio longiores (ca. 13–14 dm. longi) infra medium ramis 5–15 tertiariis floriferis, maximis 6 dm. longis praediti, sursum solum ramulos brevis foliosos non floriferos ferentes. Caulis coloribus viride et rubro maculosus, crispato-pubescens et tuberculato-pilosus, tuberculis cauli concoloribus. Folia laete viridia, utrinque minute crispato-pubescentia, inferiora ca. 140 × 28 mm., media 100 × 22 mm. Bracteae patentes, inferiores foliosae lanceolatae ca. 42 × 13 mm., superiores fructibus dimidio longiores. Hypanthium gracillimum 33–36 mm. longum, 1.5 mm. crassum, sparsim patenter pilosum et viscido-puberulum. Flores saepissime cleistogami. Calyx proprius inexpansus subquadrangulus 14 mm. longus, 4 mm. crassus, pilis viridi-tuberculatis longis, prope hypanthium vel reflexis vel erectis, prope apicem ascendentibus; apicibus liberis basi distantibus, 3 mm. longis, parallelis. Petala 10 mm. longa, 2.5 mm. lata. Stigma antheris circumdatum. Ovarium 11 × 2.5 mm., dense pilosum et puberulum, pilis triformibus, I longissimis tuberculatis albis ascendentibus, II brevibus acutis crispatis, III brevissimis viscidis erectis. Fructus virides 30 mm. longi, prope basin 6.5 mm. crassi, apicem versus angustati, pubescentia ovario similes, subscabri, pilorum tuberculis viridibus; appendicibus productis 1 mm. longis, emarginatis.— Grown from seeds collected by Dr. Geo. H. Shull at Huntington, Long Island, N. Y.; garden specimens *Bartlett* 3511, 3557, 3592, 3646. The extreme leafiness and dense branching of this species are among its most striking characters. A more minute but very distinctive characteristic lies in the long hairs of the calyx, which are retrorse or perpendicular around the top

of the hypanthium, but elsewhere on the bud cone strongly ascending. As a rule the flower-buds never open.

BUREAU OF PLANT INDUSTRY, Washington, D. C.

EXPLANATION OF PLATE 111.

Fig. a. *Oenothera Robinsonii.* Inflorescence of main stem.
Fig. b. *Oenothera Robinsonii.* Inflorescence of side branch (cf. fig. c).
Fig. c. *Oenothera venosa.* Inflorescence of side branch (cf. fig. b).
Fig. d. *Oenothera cleistantha.* Inflorescence of main stem, in fruit.
Fig. e. *Oenothera cleistantha.* Inflorescence of side branch, in flower.

THE NORTH AMERICAN REPRESENTATIVES OF DRYOPTERIS SPINULOSA, VAR. DILATATA.

M. L. FERNALD.

THE present writer, who has rarely intruded upon the preserves of the fern-specialists, ventures with some trepidation to discuss a plant which has already had more than its full share of attention. But, in an endeavor to settle as exactly as possible the identities of all the vascular plants known from Newfoundland, he has found himself constantly perplexed by the current treatments of the plant variously known in eastern America as *Dryopteris spinulosa* (Müll.) Kuntze, var. *dilatata* (Hoffm.) Underw. or *Aspidium spinulosum* (Müll.) Sw., var. *dilatatum* (Hoffm.) Hook. or *Dryopteris dilatata* (Hoffm.) Gray.

It has long been known that the common broad-fronded plant of the Hudsonian and Canadian areas of eastern America, which passes as *Dryopteris spinulosa,* var. *dilatata,* has the indusia quite glabrous, in this character exactly coinciding with the somewhat narrower-fronded *D. spinulosa* and diverging from var. *dilatata* of Europe in which the indusia, as regularly described by European authors, have the margins glandular-ciliate. In fact, in some American manuals *D. spinulosa* and its var. *dilatata* (or *D. dilatata*) are separated from var. *intermedia* (or *D. intermedia*) by their glabrous indusia, as opposed to the distinctly glandular indusia of the latter plant. In view of this departure from the European type it seems somewhat strange that American fern-students have clung so tenaciously to the name of the

European plant with glandular indusia and have so generally maintained it for the American plant with glabrous indusia. So fixed has been this tradition among American fern-students that, when the late B. D. Gilbert found an exceptional plant with glandular indusia, supposed by him to be an extreme of *D. dilatata,* he wrote:

"Babington, Sowerby, Smith, Moore, Hoffmann, Presl, DeCandolle, and most of the older botanists, regarded this [*D. dilatata*] as a distinct species. But all of them, whether they considered it a species or a variety, characterized it as having an 'indusium fringed with stalked glands.' American botanists, however, from an early period, made the point that the indusium was 'smooth and naked,' and this has been insisted upon as an indispensable requisite of the variety in this country. But is it so? If it has indusia with stalked glands in Europe, why may it not have them in this country also? It seems to me that the distinction is false, and cannot be regarded as imperative. The mere fact that much of the *dilatata* found here has a naked indusium does not preclude the possibility of a form that may agree with the English form." [1] Gilbert then goes on to identify his unusual American plant with glandular indusia not as *D. dilatata* (true) but as *Lastraea dilatata,* var. *glandulosa* Moore or, as he renamed it, *Dryopteris spinulosa glandulosa.*

The writer is not at all confident that the American plant called by Gilbert *Dryopteris spinulosa glandulosa* and subsequently renamed by him *Nephrodium spinulosum fructuosum* [2] has much in common with the plant of Moore; but Gilbert's argument, above quoted, does not change the fact that glandular indusia are practically unknown in the common plant of northeastern America now passing as *D. spinulosa,* var. *dilatata.* This is obvious not only from close study of the specimens, but from the writings of Gray, Eaton, Davenport, and a host of students of the present day; and in 1907 this common American plant was distinguished as *Aspidium spinulosum,* var. *dilatatum,* forma *anadenium* Robinson, Rhodora, ix. 84 (1907).

The chief object of the present note, however, is to call attention to a much more obvious character in which our plant departs very constantly from the European var. *dilatata.* In the common American plant the ovate or lanceolate scales of the stipe are very thin, translucent and soft in texture (like tissue paper), of a pale brown or slightly

[1] B. D. Gilbert, Fern Bull. viii. 10 (1900).
[2] Gilbert, List N. A. Pterid. 37 (1901).

rufescent color (essentially the cinnamon of Ridgway's Color Standards, but more dilute), sometimes a little deeper-colored near the center (about the warm sepia of Ridgway), and they rarely persist on the rhachis and very rarely on the rhachillas of the mature frond. In the European plant, on the other hand, the specimens fully agree with the European descriptions (too often drawn upon for American texts) in having the lance-attenuate scales very dark brown, usually blackish (closely matching in color the aniline black of Ridgway), and of comparatively firm texture, ordinarily quite like the dark basal scales of the stipe of *D. Goldiana*. These rather firm blackish scales usually persist to the summit of the mature stipe and (reduced in size) often extend well along the rhachis, and even along the rhachillas of the lower pinnae in some specimens. These characters, drawn from the European specimens in the Gray Herbarium and from an extensive suite of European material placed at the writer's disposal by Mr. Robert A. Ware, are, as said, in agreement with the European descriptions. For example, in his very detailed account of the plant in the British Isles, Moore said: "*Stipes*.... densely scaly; the scales spreading, most numerous at the base, but usually abundant throughout the whole length of the stipes, and in the normal plant lanceolate-attenuate, and dark-centered like those of the crown, frequently almost black. *Rachis* .... somewhat scaly, especially at the back, with small subulate more or less distinctly two colored scales." [1] Again, writing from the continental standpoint, Christ says: "Scales of the stipe smaller, black-brown, with paler margins." [2]

The glandular-ciliate margin of the indusium in the European plant is difficult to see except in perfect specimens; but the characteristic scales, not only in texture and color but in their comparative abundance, quickly separate the common European plant from the common plant so long mistaken for it in eastern America. In the Northwest, however, where so many identities with the European flora are known, the typical var. *dilatata* is found, much of the material from western Alaska, British Columbia and Washington and some from Oregon being quite inseparable, in the slender dark brown and rather persistent scales extending even along the middle pinnae, from the common European plant.

[1] Moore, Oct. Nat. Pr. Brit. Ferns, i. 226, 227 (1859).

[2] "Schuppen des Blattstiels schmaler, schwarzbraun mit blasserem Rande" — Christ, Farnkr. der Erde, 261 (1877).

That the common plant of eastern America has the scales paler-colored than in most European plants is not a new observation, though current descriptions and treatments of the plant might so indicate. The late D. C. Eaton explicitly said: "In European examples of [*Aspidium spinulosum*,] var. *dilatatum* the scales have a very conspicuous dark central spot or stripe. This is sometimes lacking in European specimens,[1] and generally so in North American. I notice a little of it in Oregon plants [typical var. *dilatatum* as above pointed out]."[2] Still earlier, the learned Gustav Kunze, recognizing in the common plant of our northern latitudes and mountains its true affinity, as a variety or species closely related to typical *D. spinulosa*, with its thin and pale quickly deciduous scales and glabrous indusia, rather than to true var. *dilatata*, published the following luminous note, which has received less attention than it deserves from students of American ferns:

"The identity of *A*[*spidium*] *spinulosum*, Sw., *A. dilatatum*, Sw., *A. dumetorum*, W., and *A. intermedium*, W., as different forms of one species, cannot be doubted any longer. A peculiar variety of *A. spinulosum* occurs in the northern latitudes and on the mountains of the Southern States, which must be studied more closely in its native localities, as it may prove to be a distinct species. I have specimens of this form from Newfoundland (La Pylaie), Greenland, and Labrador (Breutel and Kurr), New England mountains, sterile (Tuckerman), and from the highest tops of the Black Mountains, North Carolina (Rugel). Cultivated specimens have been communicated to me from the botanical garden of St. Petersburg, (Dr. Fischer as *A. spinulosum americanum*,) and from that of Berlin. The lowest pair of the mostly opposite pinnae is *ascending* and *curved upwards*, and has a *different direction from the other pinnae*. The pinnulae are more deeply pinnatified, with more and sharper teeth than in the common form; *those of the lowest pinnae, especially near the base, are much elongated downwards*, by which these pinnae assume a very irregularly triangular shape. The sori are nearer the middle nerve. The stipe is thickly covered with brown or redish paleae. If this form

[1] Eaton here referred to extreme variations in Europe, such as *Lastrea dilatata*, var. *glandulosa* Moore, with "fronds densely covered with stalked glands beneath....; scales....pale whole-coloured, or faintly two-coloured, broadly lanceolate-ovate" — See Moore, l. c. 226.

[2] Eaton, Ferns N. A. ii. 167 (1880).

should eventually prove to be a distinct species, the name of *A. campylopterum* would be appropriate." [1]

Here, apparently, is the first and only time (except that Kunze subsequently listed it without comment) that the common plant of the New England and Canadian uplands has been given the recognition it deserves. Except in stature, broader fronds and more elongate irregularly triangular lower pinnae, the plant is close to *Dryopteris spinulosa* and in our northern forests certainly grades into it. As a variety, however, it deserves recognition as

Dryopteris spinulosa (Müll.) Kuntze, var. **americana** (Fischer), n. comb. *Aspidium spinulosum americanum* Fischer according to Kunze, Am. Journ. Sci. ser. 2, vi. 84 (1848), not *A. americanum* Davenp. Am. Nat. xii. 714 (1878). *A. campylopterum* Kunze, l. c. (1848). *A. spinulosum*, var. *dilatatum*, forma *anadenium* Robinson, Rhodora, ix. 84 (1907).— Greenland and Labrador to British Columbia, south to the uplands of New England, Pennsylvania, Michigan, Idaho and Oregon, and on the mountains to North Carolina and Tennessee. Also eastern Asia.

Gray Herbarium.

[1] Kunze, Am. Journ. Sci. ser. 2, vi. 83, 84 (1848).

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OENOTHERA ROBINSONII (figs. a & b); OE. VENOSA (fig. c); OE. CLEISTANTHA (figs. d & e).

Rhodora

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WASHINGTON AND MICHAUX.

C. S. Sargent.

The first part of André Michaux's Journal of his travels in North America, covering the time from his arrival in this country in 1785 until his first visit to South Carolina in 1787, was unfortunately lost in the wreck of the ship in which Michaux returned to France, and little of his movements in the first years of his visit is known beyond the fact that he established a nursery in the neighborhood of New York from which he sent seeds and a large number of seedling trees back to France. The fact that during this time he paid a visit to Washington at Mt. Vernon seems to have generally escaped notice. The following extracts from Washington's unpublished Diary, now in the Library of Congress, may therefore be of interest to American botanists:

Monday, June 19, 1786.

"A Monsr. André Michaux, a Botanist sent by the Court of France to America (after having been only 6 weeks returned from India) came in a little before dinner with letters of introduction and recommendation from the Duke de Lauzen and Marqs. de la Fayette to me — he dined and returned afterwards to Alexandria, on his way to New York, from whence he had come; and where he was about to establish a Botanical Garden."

Thursday, June 29.

"Planted in one row between the Cherokee Plumb and the honey locust, back of the No. Garden adjoining the green House (where the Spanish Chestnuts had been placed and were rotten) 25 of the Paliurus,

very good to make hedges and inclosures for fields — Also in the section between the Work House and Salt House, adjoining the Pride of China Plants, and between the rows in which the Carolina laurel seeds had been sowed, 46 of the Pistatia nut in 3 rows — And in the places where the Hemlock pines had been planted and were dead, Et. & Wt. of the Garden gates, the seeds of the Piramidical Cyprus 75 in number — all of which with others were presented to me by Mr. Michaux, Botanist, to his Most Christian Majesty."

July 1st.

"Planted 4 of the Ramnus Tree (an evergreen) one on each side of the Garden gates — a peg with 2 notches drove down by them (Pegs No. 1 being by the Pyramidical Cyprus) — also planted 24 of the Philirea latifolio — (an evergreen shrub) in the Shrubberies by Pegs No. 3 — and 48 of the Cytire — a tree produced in a cold climate of quick growth, by pegs No. 4 — All these plants were given to me by Mr. Michaux."

Arnold Arboretum.

NOTES ON THE GENUS SABATIA.

S. F. Blake.

(Plate 112.)

1. Sabatia difformis (L.) Druce (*S. lanceolata* (Walt.) T. & G.).— *Swertia difformis* L. Sp. i. 226 (1753). *Chironia lanceolata* Walt. Fl. Car. 95 (1788). *Sabbatia corymbosa* Baldw. ex Ell. Sk. i. 283 (1817). *Sabbatia lanceolata* [1] (Walt.) T. & G. ex Gray, Man. ed. 1. 356 (1848). *Sabbatia difformis* (L.) Druce, Bot. Exch. Club Rep. 1913, iii. pt. 5, 422 (1914), as to name-bringing synonym only.— The Clayton type of *Swertia difformis* L., which was based on Gronovius's "Gentiana foliis linearibus acuminatis, pedunculis longissimis nudis unifloris oppositis" (Fl. Virg. ed. 1. 30 (1739)), is in the British Museum and

[1] The name *Sabbatia lanceolata* first occurs in Raf. Fl. Tell. iii. 30 (1836), but is there merely a nomen without synonym.

consists of the uppermost portion of a specimen of the plant which has long been known as *Sabbatia lanceolata* (Walt.) T. & G., with long opposite linear-filiform-bracted one-flowered peduncles, linear-subulate slightly fleshy calyx-lobes 4–6 mm. long, flowers all 5-parted except the terminal which is 6-parted, and oblong-lanceolate acutish petals 11–12 mm. long (white, according to Clayton). The sheet is marked "D. Clayton ex Virginia, Swertia corollis quinquefidis, terminali sexfida, pedunculis longissimis, foliis linearibus, Linn. Sys. gen. 284, n. 2"; below is another label, crossed out on the sheet, similar except that the reference is to "Linn. Spec. 226" instead of to the Genera. Although the specimen does not bear Clayton's number 171, cited by Gronovius for the species, it may safely be taken as type in view of its entire agreement with the very definite points of the Gronovian and Linnaean descriptions. The name *Sabatia difformis*, taken evidently from the inconstant difference in number of parts of the lateral and terminal flowers, must accordingly replace *S. lanceolata*. *Swertia difformis* L. has long been referred with more or less doubt by authors to *Sabatia Elliottii* Steud., although its published character of "pedunculis. . . .oppositis" should have prevented such confusion, since *S. Elliottii* (*S. paniculata* Ell., not Pursh) belongs to the group with alternate branches. Its identity with *S. lanceolata* was however long ago noted by Grisebach in A. DC. Prod. ix. 49 (1845), probably following Pursh, Fl. i. 138 (1814), who says: "This [i. e. *S. paniculata* (Michx.) Pursh, with the varieties α. *latifolia* Pursh (= *C. lanceolata* Walt., *Sw. difformis* L.) and β. *angustifolia* Pursh (= *S. paniculata* as now restricted)] certainly is the long lost *Swertia difformis*, as the specimens in the Herbarium of Clayton, now in possession of Sir Joseph Banks, sufficiently prove." What the "specimens" were, other than the one under discussion, is not evident, but the use of the plural may have been simply another slip on the part of Pursh. Certainly this specimen is the only one of Clayton's few Sabatias now extant which Pursh could by any possibility have referred to his *S. paniculata*.

The name *Sabatia* (*Sabbatia*) *difformis* has recently been published by Druce, in a long list of new combinations among which American botanists will be somewhat surprised to discover *Nemopanthus mucronata* [(L.) Trel. 1892] and *Chiococca alba* [(L.) Hitch. 1893] indicated as new, among others; but his unfortunate failure to examine the type of the species leads him to identify the name with *S. Elliottii*

Steud., with which, despite the reference in the Index Kewensis, it has no connection whatever.

2. Sabatia campanulata (L.) Britton (*S. gracilis* (Michx.) Salisb.). — *Chironia campanulata* L. Sp. i. 190 (1753). *Chironia gracilis* Michx. Fl. i. 146 (1803). *Sabbatia gracilis* (Michx.) Salisb. Par. Lond. t. 32 (1806). *Sabbatia campanulata* (L.) Torr. in Griseb. Gentian. 120 (1839), as syn.; Britton, Mem. Torr. Club, v. 259 (1894).— The name *Sabatia campanulata* has been in use by many American botanists for some years, but in the seventh edition of Gray's Manual, 655 (1908) the name *S. gracilis* is employed, and *S. campanulata* Torr. is referred to it with a mark of interrogation, presumably following the Synoptical Flora, ii. pt. 1. 115 (1878). Dr. Gray's hesitation to adopt Linnaeus's name seems to have been due chiefly to the fact that the habitat of the plant was given as "Canada" in the Species Plantarum. No locality is indicated on the type sheet in the Linnaean Herbarium, however, and a specimen from Kalm, perhaps a cotype, in the Læche Herbarium now incorporated in the British Museum collections, is marked simply "America," so that Linnaeus's reference of the species to Canada is obviously an error, due doubtless to the fact that so large a proportion of Kalm's plants came from Canada. The specimen from the Leche Herbarium is also authentic for *S. gracilis* Salisb., as it bears the name "gracilis Michx." followed by Salisbury's initials. Both sheets represent *S. gracilis* of Gray's Manual, a name which must be replaced by *S. campanulata*. The large-flowered variety from Florida should take the name Sabatia campanulata (L.) Britton, var. **grandiflora** (Gray) Blake (*Sabbatia gracilis* Salisb., var. *grandiflora* Gray, Syn. Fl. ii. pt. 1, 115 (1878). *Sabbatia grandiflora* (Gray) Small, Fl. S. E. U. S. ed. 1. 928 (1903)).

In Small's Flora the characters of *S. campanulata* and *S. stellaris* appear to be interchanged, so far as may be gathered from the somewhat contradictory key and descriptions. In the key to species (p. 927) *S. stellaris* is said to have "calyx-lobes fully as long as the corolla," which would indicate *S. campanulata;* but in the description we find: "calyx glabrous; lobes narrowly linear, 8–12 mm. long, acute, fully ½ as long as the corolla-lobes"; and again in the same sentence: "corolla pink or white; lobes oblong or oblong-spatulate, rarely surpassing the calyx-lobes." *S. campanulata* according to the key has corolla lobes 1–1.5 cm. long; but the description reads: "calyx glabrous; lobes....8–12 mm. long; corolla....lobes....about twice as long as the calyx-lobes."

3. Sabatia foliosa Fernald (*S. Harperi* Small). After examining cotypes of both these species, I have been unable to discover sufficient difference between the two to warrant their separation. *S. foliosa* was originally described (Bot. Gaz. xxxiii. 155 (1902)) as having "leaves ....lanceolate to oblong-lanceolate....2.5 to 6 cm. long, 0.5 to 1.2 cm. broad," "calyx with ....oblanceolate remote lobes 1.3 to 2.5 cm. long." The species was based primarily on Curtiss 5928 from Florida, but to it were also referred plants collected by J. D. Smith in South Carolina. Later, Harper (Bull. Torr. Club, xxx. 338 (1903)) reported it from Georgia (*Harper* 964, 1196), his specimens being identified by Fernald. On these two numbers Small's *S. Harperi* (Fl. S. E. U. S. 928, 1336 (1903)) was based. The diagnostic characters of the two supposed species, as indicated by Small's descriptions, are as follows: *S. Harperi:* "leaf-blades lanceolate or oblong-lanceolate....1.5–3.5 cm. long....partly clasping....calyx....lobes slightly broadened upward, about ½ as long as the corolla....: corolla....lobes....1.5–2.5 cm. long." *S. foliosa:* "leaf-blades....linear-oblong to linear-lanceolate or almost linear,....2–6.5 cm. long,....sessile....: calyx ....lobes linear,....as long as the corolla or nearly so....: corolla ....lobes 1.2–2.5 cm. long." The non-existence of the differential characters here adduced is shown by the following notes taken from an examination of *Harper* 964 (cotype of *S. Harperi,* in British Museum) and *Curtiss* 5928 (cotype of *S. foliosa,* in Kew Herbarium). *Harper* 964: leaves (middle and upper) oblong to oblong-lanceolate, slightly clasping, 2.5–3.5 cm. long, 8.5–15 mm. wide; calyx-lobes spatulate-linear, broadened upwardly, 13.5–15 mm. long, 1.4–2 mm. wide; corolla-lobes 14.5–17.5 mm. long (corolla including tube 2.1 cm. long). *Curtiss* 5928:[1] leaves narrowly oblong to narrowly oblong-lanceolate ("linear-oblong to....almost linear," Small, l. c.), 3.8–5.3 cm. long, 8.5–10.5 mm. wide; calyx-lobes spatulate-linear, broadened upwardly, unequal, 10.5 20 mm. long, 1.8–3.3 mm. wide; corolla-lobes 15–16 mm. long (whole corolla 2 cm. long). Since neither the alleged differences in leaves or those in calyx are borne out by cotypes of the two species concerned, *S. Harperi* must be relegated as a synonym to *S. foliosa,* which has a year's priority.

[1] These measurements are taken from a well-developed specimen. An undeveloped one-flowered plant 1.3 dm. high has calyx-lobes 9.5–10 mm. long, and ovate-oblong middle leaves 2–2.2 cm. long, 5–7 mm. wide.

4. Sabatia **obtusata** n. sp., perennis valde stolonifera caule erecto leviter biangulato simplice vel subsimplice 2–2.5 dm. alto uni- vel bi-floro; foliis infimis oblanceolatis vel spathulatis subacutis 2.5–3.5 cm. longis 3–7 mm. latis; caulinis tenuibus ca. 12-jugis oblongis vel ovalibus apice rotundatis sessilibus non amplectentibus 1.5–2.5 cm. longis 3.5–10 mm. latis internodia subaequantibus, costa basi incrassata albida venis lateralibus 1–2-jugis inconspicuis; pedunculis 1–3.5 cm. longis; calycis tubulo subscarioso ca. 20-nervio 1.5–2.5 mm. alto, laciniis 9–10 lineari-lanceolatis acutis trinerviis planis sursum paullum ampliatis 5–11 mm. longis 0.6–1.6 mm. latis; corollae laciniis 9–10 cuneato-lanceolatis obtusis roseis basi macula aurea rubro-marginata praeditis 1.2–2.2 cm. longis 3–6 mm. latis; stylo 2 mm. longo; stigmatibus 6 mm. longis.

Erect stoloniferous perennial, usually simple, one- or two-flowered, 2–2.5 dm. high; lowest leaves oblanceolate to spatulate, subacute, 2.5–3.5 cm. long, 3–7 mm. broad; stem-leaves thin, about 12 pairs, oblong or oval, rounded at tip, sessile but not clasping, about equalling the internodes, 1.5–2.5 cm. long, 3.5–10 mm. broad, the midrib whitish and conspicuous, the 1–2 pairs of lateral veins obscure; peduncles 1–3.5 cm. long; calyx-tube subscarious, about 20-nerved, 1.5–2.5 mm. high; the segments 9–10, lance-linear, acute, slightly broadened upwardly, flat, 3-nerved, 5–11 mm. long, 0.6–1.6 mm. broad; corolla-lobes 9–10, wedge-lanceolate, obtuse, rose-color with a red-bordered golden eye, 1.2–2 cm. long, 3–6 mm. broad; style 2 mm. long; stigmas 6 mm. long.

Georgia: shallow water near Lumber City, 18 July 1905, *Biltmore Herbarium* (type sheet in British Museum).

A rather strongly marked new *Sabatia,* distinguished at once by its very short round-tipped leaves about equalling the internodes; related to *S. dodecandra* (L.) BSP., from which it differs in its leaves and lower simple freely stoloniferous stem; and to *S. foliosa* Fernald (*S. Harperi* Small), which has lanceolate to lance-oblong, subobtuse and slightly amplexicaul leaves, 2.5–6 cm. long, and considerably longer calyx-lobes (mostly 1.2–2 cm. long).

5. Sabatia **capitata** (Raf.) n. comb. (*S. Boykinii* Gray).— *Pleienta capitata* Raf. Fl. Tell. iii. 30 (1836). *Sabbatia Boykinii* Gray in Chapm. Fl. S. E. U. S. ed. 1. 354 (1860). *Lapithea Boykinii* (Gray) Small, Fl. S. E. U. S. ed. 1. 929 (1903).— Rafinesque's *Pleienta capitata,* described from the Unaka and Cherokee Mountains along the Tennessee-North Carolina border, close to Whitfield County, Georgia, where *Sabatia Boykinii* has been collected, is evidently identical with the latter species. Rafinesque's description, published in the rare Flora Telluriana, may be quoted: "498. *Pleienta capitata* Raf. caule

rigido tereto bisulcato, fol. remotis obl. lanceol. acutis uninervis, inferis ellipt. fl. term. capit. involucr. sub 8 andris, cal. lanceol. cor. brevoir, lac. cor. spatul. obt.—Unaka and Cherokis mts. very distinct sp. next to *Pl. gentianoides*, leaves uncial, fl. white or incarnate in sessile heads of 3 to 5, involucre of 4 leaves" (Raf. l. c. 30–31). The following specimens have been examined: GEORGIA: eastern base of Dick's Ridge, alt. 305 m., Whitfield Co., 27 July 1900, *P. Wilson* 142 (Br. Mus.); woods east of Taylor's Ridge, alt. 350 m., Whitfield Co., 26 July 1900, *P. Wilson*, 134 (Kew); near Pigeon Mt., alt. 595 m., Walker Co., 1 Aug. 1900, *P. Wilson* 172 (Kew); ALABAMA: Blount Co., Oct. (fruiting), *Rugel* (Br. Mus.). There are also two specimens without locality from Schweinitz in Kew Herbarium, bearing an unpublished name indicating the same habitat as that originally ascribed by Rafinesque to the species. Gray's *S. Boykinii* was based on specimens collected by Dr. Boykin in "middle Georgia." The plant has not been collected in Tennessee in recent years, and it is not improbable that Rafinesque's specimens came from Georgia. Harper has reported it (Bull. Torr. Club, xxviii. 478 (1901)) from Alabama (*Pollard & Maxon*) and from several localities in northwestern Georgia.

6. Rafinesque's genus Pleienta[1] (l. c. 30 (1836)) included the Sabatias with 7–12-merous flowers, and had as "type the *Chl. dodecandra* L." It is thus strictly synonymous with *Sabatia* Adans. (Fam. ii. 503 (1763)), based on the "Gentiana floribus duodecim petalis, foliis distinctis" of Gronovius (Fl. Virg. ed. 1. 29 (1739)), which is *S. dodecandra* (L.) BSP. The *Pl. gentianoides* with which Rafinesque compared his new species *Pl. capitata* is evidently *Sabatia gentianoides* Ell., for which together with *S. Boykinii* (i. e. *S. capitata*) the genus *Lapithea* Griseb. is maintained by some. This was first proposed as a section (*Pseudochironia*) of *Sabatia* by Grisebach in 1839, founded on *S. gentianoides*, and characterized by "Antherae uno cyclo tortae, speciosae! Flores subsessiles, capitati," in opposition to the section *Eusabbatia*, including the other species of the genus, with "Antherae demum recurvae. Flores pedicellati, aut paniculati, aut caule dichotomo solitarii." In Grisebach's revision of the family in the Prodromus the section was raised to generic rank as *Lapithea*,

[1] "497. PLEIENTA Raf. (more added) *Sabbatia* Ad. non alis. diff. 496, cal. 7–12part. stam. 7–12 stylo sepe recto &c. — Although this G. chiefly depends on extra numbers, it is a very natural one, prolific also of Amer. sp. It chiefly differs from *Chlora* by the unequal calix. Type the *Chl. dodecandra* L. which included 12 blended sp. see my monograph N. Sp. *Pl. leucantha, rigida, flexuosa, fasciculata, capitata, &c.*"

which is retained in Bentham & Hooker's Genera Plantarum and in Small's Flora. It seems to the writer that the differences in anthers and inflorescence are not sufficient to justify the maintenance of *Lapithea* as a genus, but that the group is better treated as of subgeneric value. The genus may be further divided into sections and subsections in the following manner:

Synopsis of Sabatia Adans.

Subg. I. **Eusabatia** (Griseb.) n. comb.— *Sabbatia* sect. *Eusabbatia* Griseb. Gentian. 120 (1839).— Flowers solitary, scattered, or cymose-panicled, pedunculate. Anthers recurved or spirally coiled.

Sect. 1. **Pentapetala.** Floribus 5(rare 6–7)-meris minoribus. Type-species *S. angularis* (L.) Pursh.

Subsect. A. **Angulares.** Ramulis oppositis; calyce non costato.

1. S. macrophylla Hook.
2. S. angularis (L.) Pursh.
3. S. difformis (L.) Druce.
4. S. paniculata (Michx.) Pursh.
5. S. brachiata Ell.

Subsect. B. **Campanulatae.** Ramulis alternis; calyce non costato.

6. S. Elliottii Steud.
7. S. stellaris Pursh.
8. S. campanulata (L.) Britton
8b. " " v. grandiflora (Gray) Blake.
9. S. simulata Britton.
10. S. Purpusii Brandegee.[1]
11. S. Palmeri Gray.
12. S. maculata (Benth.) Benth & Hook.
13. S. calycina (Lam.) Heller.

Subsect. C. **Campestres.** Ramulis alternis; calyce valde costato.

14. S. campestris Nutt.
15. S. carnosa Small.
16. S. arenicola Greenm.

Sect. 2. **Pleienta** (Raf.) n. comb. Floribus 8–12-meris majoribus.— *Sabbatia* subg. *Plurimaria* Raf. Med. Fl. ii. 76 (1830) in part; *Pleienta* Raf. Fl. Tell. iii. 30 (1836), in part.

17. S. foliosa Fernald.
18. S. obtusata Blake.
19. S. dodecandra (L.) BSP.
20. S. decandra (Walt.) Harper.

Subg. II. **Pseudochironia** (Griseb.) n. comb.— Flowers sessile in terminal and axillary bracteate heads of 1–7. Anthers slightly twisted laterally.— *Sabbatia* sect. *Pseudochironia* Griseb. Gentian. 125 (1839. *Lapithea* Griseb.

[1] Perhaps not distinct from *S. Palmeri*, of which no specimen has been available for comparison.

in A. DC. Prod. ix. 48 (1845). *Sabbatia* subg. *Plurimaria* Raf. l. c. in part. *Pleienta* Raf. l. c. in part.

21. S. gentianoides Ell.

22. S. capitata (Raf.) Blake.

LONDON, ENGLAND.

EXPLANATION OF PLATE 112.

Fig. A. *Sabatia difformis* (L.) Druce. 1. Type, ½ nat. size. 2. Flower, about 1½ nat. size. (British Museum.)

Fig. B. *S. campanulata* (L.) Britton. Type, ½ nat. size. (Linnaean Herbarium.)

Fig. C. *S. obtusata* Blake. 1. Type, ½ nat. size. 2. Calyx, about 1½ nat. size. (British Museum.)

CAREX TUCKERMANI NIAGARENSIS; A NEGLECTED SEDGE.

C. P. SMITH.

WHILE in Niagara county, New York, in the summer of 1911, I collected a variety of Carex which is not, at least to my satisfaction, accounted for in our present-day floras. Every effort to determine the form led to *C. Tuckermani* Dewey; but from that species, as illustrated and described, this plant differs in certain apparent characters. Accordingly, after referring to the original description and illustration, and examining the material in the *C. Tuckermani* covers of the Cornell University and the U. S. National Herbaria, I have decided to make record of the plant as follows:

CAREX TUCKERMANI **niagarensis** var. nov. a forma typica differt culmis late patentibus; spicis nutantibus, deorsum floribus plus minusve laxis; perigyniis latissime ovoideis vel deltoideis, basi plerumque obliquis planisque.

Differs from the typical form in its widely spreading culms, nodding spikes with flowers more or less scattered below, triangular-ovoid, deltoid, or even rhomboidal perigynia with the base commonly oblique or truncate.

My No. 2438, 27 August, 1911, Youngstown, N. Y., is taken as the type collection. No. 2554 is also typical, being from "West Hill," Ithaca, N. Y., 28 June, 1912, matured akenes having been subsequently

secured on July 22. Various other herbarium specimens indicate frequent occurrence of this variety in Western New York, and its general distribution must be more or less the same as that of the species, if I am justified in crediting to var *niagarensis* the U. S. National Herbarium sheets numbered and labeled as follows:

30410 — H. P. Sartwell, Penn Yan, N. Y.
295054 — F. V. Coville, 10 June 1884, Oxford, N. Y.
134251 — L. F. Ward, August 1879, Indian River, N. Y.
242817 — A. P. Garber, 25 July 1868, Greenville, Mercer county, Pa.
239176 — J. Fowler, 16 August 1881, Sharhott Lake, Ont.
605631 — J. Fowler, 26 July 1902, Plevna, Ont.
30407 — F. F. Wood, 28 June 1889, bank of Bad River, Wis.
30602 — F. F. Wood, 13 August 1891, Barron, Wis.
131962 — M. S. Bebb, 1870, Fountain, Ill.
30408 — C. A. Ballard, July 1893, Lake Kilpatrick, Minn.

Pressed young material can evidently not be determined, as many June, and even some July, collections do not seem to have the perigynia matured enough to show determinative characters after being pressed; e. g., of three sheets of Sartwell's specimens in the National Herbarium, I care to cite only one as showing evidence of representing the variety I describe. The original illustration of Dewey's seems to have been made from very young material and can easily confuse one in trying to study the species in its matured forms.

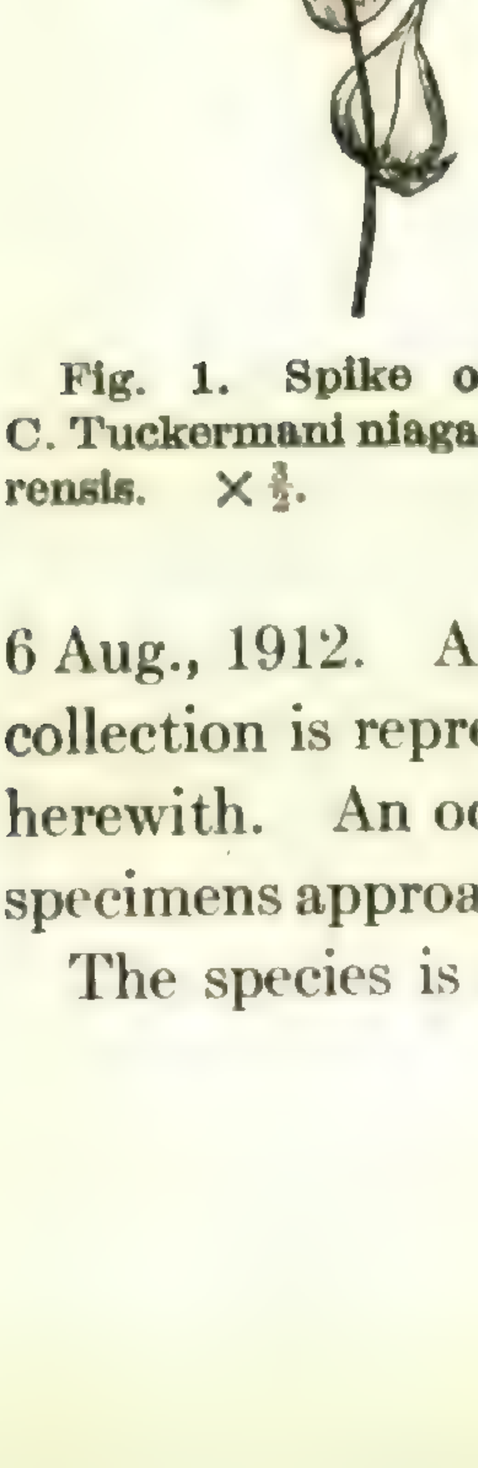

Fig. 1. Spike of C. Tuckermani niagarensis. × ½.

My only collection which I am willing to call typical *C. Tuckermani* was found in a water-shed bog a short distance north of Summit Marsh, North Spencer, Tioga county, N. Y., and is my No. 2583, 6 Aug., 1912. A normal perigynium from this collection is represented at "c" in the figures herewith. An occasional perigynium of these specimens approaches the deltoid shape, however.

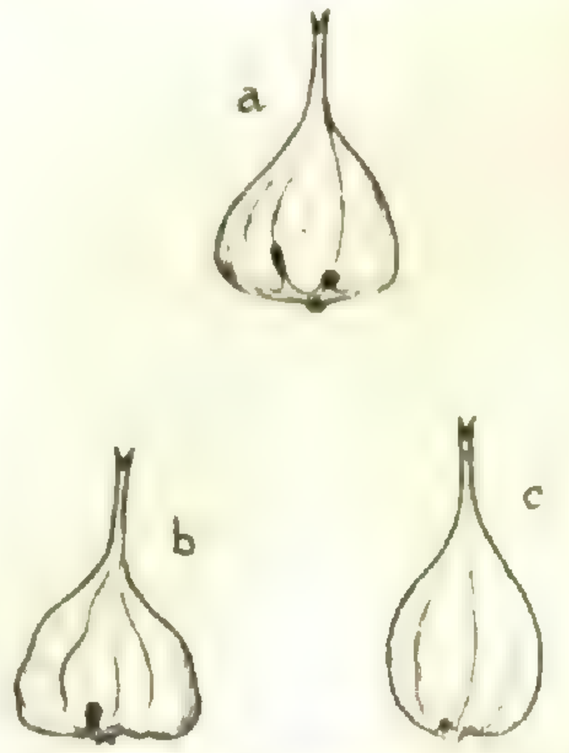

Fig. 2. Perigynia × 2 a & b. C. Tuckermani niagarensis. c. C. Tuckermani (typical form).

The species is designated as a plant of "wet meadows" (Dewey),

of "bogs and meadows" (Britton & Brown), and of "rich alluvial shores, rarely in swamps" (Grays Manual, 7th ed.). The var. *niagarensis*, where observed by me, was a resident of level, poorly-drained, open woodland and thickets, confined to edges of vernal pools and depressions where moisture lingers well into the hot days of summer, but where the surface soil-layers dry out and crack before the akenes are mature.

My drawings are from specimens preserved unpressed especially for this purpose, all from the type material of the variety herein described, excepting the perigynium marked "c," referred to above.

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College Park, Maryland.

THE NAME OF THE HEMLOCK SPRUCE.

ALFRED REHDER.

UNDER the title "The correct name of the hemlock spruce" an interesting article by Oliver A. Farwell appeared in the December number of the Bulletin of the Torrey Botanical Club (Vol. XLI, 621–629). As I cannot agree with some of the statements made by the author and particularly with his conclusion that the correct name of the Hemlock Spruce ought to be *Tsuga americana*, I venture the following remarks to show that the name *Tsuga canadensis* for this tree should be retained.

In fixing the type of *Pinus canadensis* Linnaeus (*Spec.* Ed. 2, 1421) one has to consider that the diagnostic phrase is taken nearly literally from the synonym of Gronovius. This shows as clearly, as if Linnaeus had expressly designated the Gronovian plant as the type of his species, that his *Pinus canadensis* is based primarily on the plant described by Gronovius; that this is the Hemlock Spruce there can be no doubt, as Farwell himself admits. To Farwell's further deductions, however, I cannot subscribe; he says: "If we take the first synonym enumerated under a species in case no type is specifically named, then *Pinus canadensis* becomes a pure synonym of *Pinus balsamea* Linnaeus, for the first synonym cited under both species is the same Gronovian

species which is the Hemlock Spruce." According to the Philadelphia Code, the taking of the first synonym as the type is only resorted to when there is no other way to determine the type, but this is not so in this case, for, we find that here again Linnaeus indicates in his diagnostic phrase what he considers the type of his *Pinus balsamea;* that phrase is abstracted from the detailed description of the leaves of his species and not from any of the synonyms, as in none of them is any mention of subemarginate leaves or of their two white lines beneath. By reading carefully Linnaeus' description and taking into consideration the geographical distribution he attributes to his species we must come to the conclusion that he had in mind a true Fir, and as there are only two species, namely *Abies balsamea* and *Abies Fraseri* native to eastern North America and as the latter was not known at that time, no botanist having then penetrated to the higher altitudes where *Abies Fraseri* grows, Linnaeus could have meant no other species but *Abies balsamea.* From the detailed description he gives we may assume that he had specimens before him, either from a cultivated tree or from the collection brought back by Kalm who may have come across this species during his travels. Also the specific name "balsamea" shows that he got his information elsewhere and not from the synonyms where no reference to "balsam" occurs. I cannot understand how Farwell can assert that "there is absolutely nothing in the descriptive matter that will limit it to any species." The comparison with *Pinus Picea* excludes the Spruces and the description of the leaves as broader than those of the Silver Fir excludes the Hemlock Spruce, and neither *Tsuga canadensis* nor any of the Spruces have the white bands of the underside of the leaves composed of 8 rows of stomata; the former has only 5 or 6 and the Spruces even less, while *Abies balsamea* has indeed usually 8 rows of stomata.

Miller adopted binomial nomenclature in the 8th edition of his Dictionary and gave specific names under Abies to four American species which he had already distinguished but not specifically named in 1759 in the 7th edition of his Dictionary. In transferring the Linnaean specific names from Pinus to Abies he made the mistake, if it really was his intention to transfer the names, of transferring the name canadensis to the previously unnamed species No. 5 of the 7th edition, probably because this number was placed by Linnaeus as a synonym under his *Pinus canadensis,* and of creating a new name for No. 3 which ought to have been called *A. canadensis* according to the

rule of priority. That Miller used the name canadensis for the White Spruce does not change the fact that canadensis is the oldest specific name for the Hemlock Spruce, since the Hemlock Spruce is the type of *P. canadensis*, as shown above, and since no subsequent author can change the type of a species previously described. Farwell asserts that Miller in splitting *Pinus canadensis* into two species could choose, if the names are of the same date, and that his choice could not be modified according to article 46 of the International Code. Now article 46 reads: "When two or more groups of the same nature are united, the name of the oldest is retained. If the names are of the same date, the author chooses and his choice cannot be modified by subsequent authors." As the wording shows this article does not refer to the division of species, but to the union of two or more species under one name. In article 47 which deals with the division of a species, nothing is said about the right of the author to choose, but the article rules that "if one of the forms was described earlier than the other, the name is retained for that form.

Therefore taking as proved that the type of *Pinus canadensis* is the Hemlock Spruce, "canadensis" remains the correct specific name for this tree and Miller's specific appellation is a non-valid [1] name having been formed contrary to the rules of nomenclature. More doubtful seems the validity of Miller's *Abies canadensis*, but as Miller does not quote *Pinus canadensis* Linnaeus as a synonym, *Abies canadensis* Miller may be considered a new name, and as the White Spruce had no earlier binomial appellation canadensis must stand as the oldest specific name, though the presence of an earlier homonym, viz. *Pinus canadensis* L., precludes the use of this specific name for the White Spruce, if transferred to the genus Pinus, and on the other hand the specific name "canadensis" cannot be used for the Hemlock Spruce, if transferred to the genus Abies, on account of the older *Abies cana-*

[1] The terms valid and non-valid have often been used indiscriminately for names which have become synonyms both for taxonomic or for nomenclatorial reasons. They should, however, be used for names only which belong to the latter category. This is made clear by the revised article 56 of the International Code (Act. Congr. Intern. Bot. Bruxelles 1910, I. 107) which reads: "Dans les cas prévus aux articles 51 à 55 le nom à rejeter ou à changer est remplacé par le plus ancien nom valable existant pour le group dont il s'agit et à défaut de nom valable ancien un nom nouveau (un binôme nouveau) doit être créé. Par nom valable on entend ici un nom et en particulier une combinaison de noms créés en conformité avec l'ensemble des règles de la nomenclature." A non-valid name always remains a synonym while a name which has become a synonym by change of generic or specific limitations may be revived at any time by another change in the taxonomic valuation of genera or species. A non-valid name, therefore, may be termed an unconditional synonym while a synonym for taxonomic reasons is a conditional synonym.

densis Miller.[1] If, however, one takes the view that *Abies canadensis* is not a valid name (see footnote on the preceding page), as it is against the rules of nomenclature in so far as Miller should have used this combination for the Hemlock Spruce, the oldest name for the White Spruce would be *Picea glauca* Voss in Mitt. Deutsch. Dendr. Ges. XVI. 93. 1907. (*Pinus glauca* Moench, Verz. Schloss Weissenstein, 73. 1785.— *Pinus laxa* Ehrhart, Beitr. III. 24. 1788.— *Pinus alba* Aiton, Hort. Kew III. 371. 1789.)

Arnold Arboretum.

Flora of the Vicinity of New York, a Contribution to Plant Geography.— This "flora," by Norman Taylor,[2] will interest field-botanists of New England, for the area covered includes all of Connecticut as well as southeastern New York, all of New Jersey, and eastern Pennsylvania; and much emphasis is given to some of the geographic relations of the flora covered. The author's attitude is indicated by the statement in the Preface: "The attempt to explain the origin of the flora centering near the city, and the factors that have played their part in shaping its present composition, has, it seems to the writer, greater value than any enumeration of the species could possibly have." The author is modest in his approach to a vast question and, like most of those who enter such problems, has felt the handicap of too limited material for sound generalizations, saying: "no one is so conscious of the scarcity of such material as the writer. The book, therefore, is not so much a local flora as a method of writing one,—in some ways it is little more than a record of the incompleteness of our present knowledge."

As would naturally be expected, "the taxonomy and nomenclature have been brought into substantial accord with the second edition" of Britton & Brown's *Illustrated Flora*;[3] but the author expresses a

[1] The combination *Abies Picea* Miller presents a case very similar to that of his *Abies canadensis*. If *A. canadensis* is considered a valid name, *Abies Picea* Miller must be considered a valid name also, for the oldest specific name for *Pinus Abies* cannot be used, as it would duplicate the name of the genus which is against art. 51, 2 of the International code, and a new specific name was necessary for which Miller choose Picea. In this case it is quite clear that it was not Miller's intention to transfer the Linnean name from Pinus to Abies, and the same may have been the case with *Pinus canadensis* L.; we may, therefore, in both cases consider Miller's names as new names. This will prevent the use of the name *Abies Picea* Lindley in Penny Cycl. I. 29 (1833) for the European Silver Fir for which the oldest name would then be *Abies alba* Miller, Dict. Ed. 8, no. 1. 1768. (*Abies pectinata* De Candolle, Fl. Franç. III. 276. 1805, not Gilibert, nor Poiret).

[2] Memoirs of the New York Botanical Garden, Vol. V. by Norman Taylor, pp. vi + 683. Issued January 30, 1915.

[3] See Rhodora, xv. 220 (1913).

certain degree of independence in his statement that, "This does not imply, however, that the writer favors all the generic and specific delimitations of that work, nor all the nomenclatorial changes there proposed." What a pity that this healthy spirit of scientific freedom could not have found fuller expression, at least by a brief note, whenever the author felt sure of his own convictions! In a very few instances this has been done, as, for example, when *Bidens Beckii* is retained in *Bidens* instead of separated as a genus *Megalodonta*, as is done in the *Illustrated Flora;* and when *Juncoides* (or *Luzula*) *saltuense* (*J. carolinae* of the *Illustrated Flora* in great part, not *L. carolinae* Watson) is pushed back into the European *J. pilosum*. In passing it may be remarked that *Megalodonta* is a far better genus than most of the old sections and subgenera which temporarily parade as genera, and that our woodland *Luzula* is kept distinct from the European *L. pilosa* not only in American manuals but by such a learned European specialist as the late Franz Buchenau.

The catalogue of plants is presented in useful and somewhat original form, giving a statement of the local occurrence of the species in each state or section of state covered, and a paragraph indicating the occurrence or absence of the plant on certain of the geological formations. Broad ranges are also given, substantially as in Britton & Brown, and keys copied from that work are included. This body of information is bound to be much referred to by future workers, for it draws together a vast amount of material from scattered sources.

As a final authority on geographic distribution, however, the Catalogue would have gained greatly if its author had restricted himself less to the dictum of the *Illustrated Flora* and had given recognition to some interpretations not there included. For example, it is difficult to understand, now that the question has been worked out,[1] how a student of plant geography can be content to call our annual *Polygonum glaucum* identical with the southern European frutescent *P. maritimum*, or our endemic *Plantago decipiens* specifically identical with the Old World *P. maritima*. Another unfortunate result of accepting unquestioned the evaluations put upon species by Britton & Brown and the suppression of strongly marked geographic varieties is a great distortion of the geographic truths upon which the generalizations of the book are based. The suppression of *Scirpus Smithii* Gray, as a pure synonym of *S. debilis* Pursh, for example, will appeal to no discriminating student of our sedges; and the absolute merging of Michaux's *Smilax pulverulenta* into *S. herbacea* L., with the statement that the aggregate extends eastward to New Brunswick, obscures an important fact. *S. pulverulenta*, sometimes treated as a variety but recognized as a distinct species by such a painstaking and cautious student as Dr. Witmer Stone, does not occur either in New England or New Brunswick. Similarly, the failure to distinguish

[1] See Rhodora, xv. 69–71 (1913).

many other species and good varieties, presumably because they are not recognized in the *Illustrated Flora*, throws an unfortunate shadow of uncertainty over any conclusions which may be drawn from the floristic data. The same obedient acceptance of only such species as are registered in the *Illustrated Flora* gives us anomalies like the following. On pages 265 and 266, *Salix squamata* Rydb. is numbered and entered regularly as a sound species, but with the comment, "distribution and specific status . . . . not fully understood," which is a delicate way of quoting Britton's "probably a state of the preceding species [*S. discolor*]"; but on page 283, *Urtica Lyallii* Watson "is omitted from the list because its specific and distributional status are open to question."

A flora of so large an area, and especially one upon which many scattered notes have been published, is necessarily difficult to cover with completeness, and it is natural that some perfectly good records have been overlooked. We do not find *Juncus conglomeratus* in the Catalogue, although it is geographically one of the most interesting plants of the flora covered (see Fernald & Wiegand, Rhodora, xii. 85, 86; Bissell, Rhodora xiii. 31; Fernald, ibid., 140; Stone, Pl. so. N. J. 330). *Equisetum scirpoides*, a member of the Canadian flora which extends southward into Litchfield County, Connecticut, is not definitely admitted to the Catalogue but called a "waif," thus throwing this indigenous woodland plant into the limbo with the rubbish-heap *Cycloloma*, *Beta*, and *Spinacea*! *Luzula campestris*, var. *echinata* (*Juncoides echinatum* Small) occurs in New Jersey and Pennsylvania (see Rhodora, xv. 42), and *Scirpus Peckii* is found in Connecticut (see Rhodora, xv. 98).

One of the most valuable services a compiler of a local catalogue can render is finally to dispose of old and somewhat doubtful records, or at least to take note of and indicate the present knowledge of such cases. Mr. Taylor has performed this service in several instances: *Triglochin palustris*, *Aletris aurea*, *Smilax Bona-nox*, etc.; but we miss from the list of such accountings a number of species formerly reported from the area. For instance, *Phorodendron flavescens*, reported from Staten Island (see Britton, Bull. Torr. Bot. Cl. xi. 76); a cultivated fern, thought to be an *Asplenium*, reported by Dr. Britton in 1897 as a notable case of "naturalization" (see Bull. Torr. Bot. Cl. xxiv. 588); *Pteris tremula* and *Dryopteris patens*, reported in 1897 as "naturalized" in New York City (Fern Bull. vi. 10); and *Polypodium polypodioides*, reported in 1898 as found on Staten Island in 1896 (Fern Bull. vi. 54).

In reading the Introduction to the book, which is, after all, quite as important as the Catalogue proper, for in it are the generalizations, it is impossible to avoid the impression that the author is floundering in water too deep for him. A thoroughly satisfactory correlation of the present distribution of our flora with the geological history of the continent is something to strive for, but it involves so intimate a

knowledge of the rapidly altering geological conceptions that few, if any, thorough botanists can be in position to offer more than tentative explanations. This Mr. Taylor clearly realized. But the first fundamental requirement for satisfactory generalization upon the origin of a flora is a profound and thoroughly exact knowledge of the plants, their habitats and ranges; and the second fundamental requirement should be precision in the exacting art of compilation. These requirements have, apparently, not been sufficiently realized either by the author or his advisors. At least, it is somewhat startling to find, on page 4, in the list of characteristic *bog* plants *Panicum linearifolium* and *Aster spectabilis* listed along with the real bog species *Arethusa bulbosa* and *Sarracenia purpurea*. To be sure, in the Catalogue we are told that *Panicum linearifolium* occurs in "dry soil" (p. 109) and *Aster spectabilis* in "dry sandy soil" (p. 612); but these correct statements of habitat were borrowed literally from Britton & Brown, not, it would seem, from the author's experience.

On page 5 begins a long list of "Plants Found Exclusively North of the Moraine in Our Area," introduced by a paragraph from which the inference is, that somehow this essentially northern flora has been thus delimited in its range through "the profound influence of the continental glacier." The list contains, however, such examples as *Cryptogramma Stelleri* and *Arabis viridis*, which occur in sheltered crevices or recently formed talus, chiefly of limestones and traps, and are in nowise inhabitants of glacial soils; dozens of species (such as *Abies balsamea, Sparganium minimum, Carex diandra, C. novae-angliae, Xyris montana*, etc., etc.) abounding in the woodlands, ponds or sphagnous bogs of the Magdalen Islands which "exhibit the most remarkable non-glaciated condition of any part of the eastern provinces of Canada";[1] and several species (*Trisetum spicatum, Juncus trifidus*, etc.) which are found on the high *unglaciated* Torngat Mountains of Labrador.[2] Incidentally, it may be noted that the "*Juncus trifidus*" of Taylor's Catalogue is the var. *monanthus*, by some European students treated as a distinct species and in this country occupying a strikingly different range from true *J. trifidus*; but how these plants and some scores of others in the enumeration (including the Dwarf Mistletoe, parasitic on Spruces and Larches) have had their present distribution determined by "the profound influence of the continental glacier" is not made clear.

In the long list just referred to Taylor indicates by an asterisk those plants which "have been found only at elevations in excess of 1,000 ft." This subgroup contains such plants as *Carex castanea* ("only . . . .from Salisbury, Conn." — p. 202); *Ledum groenlandicum* ("CONN. North-

[1] Chalmers, Geol. Surv. Can., Ann. Rep., n. s. vii. 48M (1895).

[2] "I was able to confirm Dr. Robert Bell in the proof. . . .that an overwhelming general glaciation of the Torngats, such as occurred in the White, Green, and Adirondack Mountains, did not take place in the last glacial epoch." — Daly, Bull. Geogr. Soc. Phila., iii. 210 (1902).

eastern Litchfield Co. N. Y. Pine Plains, Dutchess Co.," etc.— p. 488); *Valeriana uliginosa* ("known in our area only from Pine Plains, Dutchess Co., a region with....an elevation of about 1,000 ft." — p. 582); and *Petasites palmata* ("Localized in our area near Salisbury, Conn., at elevations of about 1,500 ft." — p. 634). The inaccuracy of the author's work and its consequent lack of finality are indicated when we view the real facts: that the Connecticut stations for *Carex castanea* at Salisbury (and also at Canaan — see Cat. Fl. Pl. Ct. 419) are in the alluvium of the Housatonic River at an altitude of about 400 (not 1,000 or 1,500) feet; that the Connecticut stations for *Ledum* are at an altitude between 100 and 200 (not "in excess of 1,000") feet; that the Pine Plains stations for *Ledum* and *Valeriana* are, according to their discoverer, L. H. Hoysradt, in marshes "a little lower than the village, which is about 300 [not '1,000'] feet above.... the sea" (Bull. Torr. Bot. Cl. vi. 53); and that the Salisbury station for *Petasites* is at an altitude below 600 (not "about 1,500") feet.

Other long lists, quite as carelessly compiled, are made the basis of generalizations. How unfortunate that, before publication, these lists were not carefully scrutinized by someone with a large outlook upon our flora! Thus, on pages 14–17 is a list of "Southern Species Reaching Their Northern Distribution Point Within the Range of This Book." Many of the species are properly placed in the list, but about 30 of them extend northeast of the area covered. For instance, *Potamogeton confervoides*, abundant in eastern Newfoundland, was known to the late Thomas Morong from Massachusetts, New Hampshire (altitude 3,000 feet) and Maine (see Morong, Mem. Torr. Bot. Cl. iii. no. 2, 36). The latter facts ought to be familiar to the author, who was selected as competent to recast Morong's manuscript on *Potamogeton* for the *North American Flora*. Publications, perhaps not so intimately known to the author, but as readily accessible, should have shown him, to indicate a few cases, that *Juncus aristulatus* reaches Nantucket (Bicknell, Rhodora, vi. 174 and Bull. Torr. Bot. Cl. xxxvi. 6); that *Arenaria caroliniana* reaches Rhode Island (Oakes in Hovey's Mag. xiii. 218; Olney, Bull. Torr. Bot. Cl. v. 38; Sage, Rhodora, xv. 115); or that *Acer carolinianum* (*A. rubrum*, var. *tridens*) reaches Massachusetts (Rehder, Rhodora, ix. 116) and even New Brunswick (Fernald & Wiegand, Rhodora, xii. 110, 140).

Similarly, on pages 18–20, in another extensive compilation of "Northern Species Whose Southerly Distribution Outposts, in the East, are Within Our Area," a glance at the first half-column is sufficient to indicate the same carelessness or lack of accurate knowledge which pervades the book. Here are entered *Lycopodium alopecuroides* and *L. adpressum*, in spite of the fact that in the Catalogue it is stated, with an approximation to correctness, that *L. adpressum* occurs from "Conn. to the Gulf States" (p. 66), thus overlooking its extreme abundance in Rhode Island and Massachusetts; and that *L. alopecuroides* occurs from "N. Y. to Fla., near the coast, west to Miss.

Also in trop. Am." and in New York is known only from "Babylon, L. I." (p. 66), thus disregarding its occurrence on Nantucket (Bicknell, Bull. Torr. Bot. Cl. xxxv. 55), on Staten Island (Clute, Fern Bull. ix. 9), and at Southampton, L. I. (Clute, l. c. xiii. 88).

These illustrations serve sufficiently to indicate the quality of the compilation upon which the generalizations are based, and to suggest that, when in the Preface the author referred to "the incompleteness of our present knowledge," he was presumably speaking editorially. As to the generalizations themselves, they consist largely of an amplification of the author's previously published thesis, that the Pine Barren flora of New Jersey occupies an area (the Beacon Hill formation), which escaped Pleistocene glaciation, and there persisted essentially unchanged through the Pleistocene, while the vegetation of surrounding areas was highly modified. Of the validity of the data and the conclusions on this point the reviewer is not competent to judge; but when the author enters the regions to the northeast of New York city and attempts to generalize without regard to the geological (and often botanical) evidence, he certainly overworks glaciation and lack of glaciation. This tendency has already been commented upon, and the following extract, from page 24, is to the point.

"38. In this connection the distribution of the most remarkable plant of the pine-barrens, *Schizaea pusilla*, is very interesting. It is found only in the pine-barrens and in Nova Scotia and Newfoundland, and is unknown between these points. If Dr. Scharff's recently proposed theory that perhaps parts of Nova Scotia and Newfoundland remained unglaciated through all the period of the Pleistocene is correct, then it is not impossible that *Schizaea* is a relict in the pine-barrens of its southern migration, and that it is also a relict in the north, all the intervening territory having been preempted first by the ice, secondarily by more 'aggressive' plants after the recession of the ice. This is little more than interesting speculation, but Scharff, whether wrong or right in his contention, has opened up a wide field of discussion. It is certainly significant that *Schizaea* is not found in the unquestionably glaciated country, and is found only in the pine-barrens and in the [probably] unglaciated northeast. An almost similar distribution is that of *Aster nemoralis*, which is lacking in the intervening territory between its northern outposts in northern New York and Newfoundland and its southerly stations in New Jersey."

Now, any conclusions based upon the assumptions above quoted are bound to lead diametrically away from the truth. In the first place, an author who supposes that *Schizaea pusilla* made a "southern migration" to New Jersey overlooks the fundamental fact that *Schizaea* is *not* a boreal, but a Tropical and austral genus. Hooker recognized 26 species and Christensen, though differing slightly in his interpretation, maintains the same number. Of these, 9 are confined strictly to the Southern Hemisphere (Australia, New Zealand, South Africa,

Polynesia, Patagonia, etc.), and 16 occur in the Tropics or the Tropics and southward in the Southern Hemisphere. Absolutely no species is known above latitude 30° N., except *S. pusilla*, which ranges from latitude 40°–50° N.; and this northern species is so close to Gaudichaud's *S. australis* of the Falkland Islands (near Cape Horn) and New Zealand that when La Pylaie described the Newfoundland plant as *S. filifolia* he identified the Gaudichaud material with it. Obviously, then, *S. pusilla* did not originate quite by itself in the boreal regions, antipodally separated from the bulk of the genus (and family, for that matter) and then make a "southern migration" toward the home of its congeners. On the contrary, the status of *S. pusilla* was well diagnosed by Mrs. Britton when she wrote: "It is one of the few remaining survivors of a time when a tropical flora was distributed as far north as Greenland" (Fern Bull. iv. 18). The case of *Schizaea pusilla* is not different in principle from that of *Lygodium palmatum*, *Selaginella apoda*,[1] *Eriocaulon septangulare* and others, *Lachnanthes* (*Gyrotheca*) *tinctoria*, *Podostemon ceratophyllum*, etc., whose relatives are almost wholly in the Tropics or the Southern Hemisphere.

But to return to another feature of Taylor's surmising. Any author who ventures to call Nova Scotia and Newfoundland even "probably" unglaciated shows no familiarity with those regions and a minimum of intimacy with the geological reports covering them. The reports of the Geological Survey of Canada are replete with evidence of the glaciation of Nova Scotia; and even the late J. W. Dawson, who argued strenuously for another explanation of the phenomena, admitted that "The whole surface of the peninsula has been striated and polished" (Dawson, Acadian Geol. ed. 3, 72 (1878). As to Newfoundland, Chamberlain & Salisbury say: "Newfoundland seems to have been a separate area of glaciation" (Earth History, iii. 336), and Twenhofel states that, "Glacial time saw the island under a sheet of ice" (Am. Jour. Sci., ser. 4, xxxiii. 21).

But the most amazing statement in the paragraph above quoted from Taylor is that in regard to *Aster nemoralis;* because to any experienced field-botanist its inaccuracy is so patent. Local catalogues could not have been consulted in framing this remarkable statement, for *Aster nemoralis* is listed in every New England state except Connecticut. In fact, an examination of the sheets of specimens immediately at hand shows the reviewer this species from 44

[1] Selaginella **apoda** (L.), n. comb. *Lycopodium apodum* L. Sp. Pl. 1105 (1753). *S. apus* Spring in Mart. Fl. Bras. i. pt. 2, 119 (1840).

It is astonishing that the correct name for this common creeping species has not been heretofore assigned to it. Spring, in transferring the plant to *Selaginella* as *S. apus*, took the liberty of altering the Linnean specific name, a practice very common in his time; but certainly *apus* is not the feminine form of a neuter *apodum*. And even though, in violation of all nomenclatorial rules, some people may still persist in using the name *S. apus*, it would be quite inaccurate to ascribe the specific name to Linnaeus who used a different name.

stations in "the intervening territory between its northern outposts in . . . .Newfoundland and its southerly stations in New Jersey", from which, according to Taylor, it "is lacking" — in Nova Scotia, Prince Edward Island, New Brunswick, Maine, New Hampshire, Vermont, and Massachusetts; while "its northern outposts in northern New York" are 500 miles south of the real "northern outposts" on Rupert River, entering Hudson Bay. Furthermore, the author seems to have ignored the records from Staten Island, Long Island and Rhode Island. In a single volume (vii.) of the Bulletin of the Torrey Botanical Club occur the following seemingly trustworthy records for *A. nemoralis:* "between River Head and Canoe Place," Suffolk Co., L. I. (*E. S. Miller*, p. 18); "on the Cretaceous soils of Staten Island" (*N. L. Britton*, p. 82); "Southern Rhode Island" (*W. W. Bailey*, p. 98). The fact is, that *Aster nemoralis* has not, as guessed by Taylor, been wiped out between New Jersey and Newfoundland by the ice, nor has it been crowded out by more "aggressive" plants. On the contrary, it *abounds* in the siliceous and granitic areas of eastern and central New England, Nova Scotia, and the Laurentian region of southern Labrador and northern Quebec (all profoundly glaciated); and it does so because it there finds the acid peats in which it delights to grow. But in the extensive basic or calcareous areas of western New England and much of eastern Canada, just as in the more fertile sections of Newfoundland, New York and northwestern New Jersey, it is rare or absent because the lowlands of those areas are mostly too calcareous to suit the plant.

In his effort to make the glaciation or non-glaciation of regions during the Pleistocene the dominant factor in determining the present distribution of southern plants which have reached Newfoundland or Nova Scotia, the author seems to have lost sight of a much more potent factor, namely, the now submerged continental shelf. This ancient extension of the Coastal Plain is hardly mentioned by Taylor. Nevertheless, when carefully considered in connection with really accurate phytogeographic data, it will be found to have played a far more important part in the distribution of Coastal Plain species than is generally recognized.

The reviewer's reason for thus entering at length into a discussion of the Introduction to a book, which, in spite of many admirable points, proves, on examination, to have been written without the painstaking care or the accurate compilation of facts which alone should be the groundwork for scientific deductions, is that he is intensely interested in the phytogeographic problems of northeastern America. And, at the risk of being unpopular, he feels it important, for the advancement of sound scholarship, to protest against the superficial and careless compilations which are so freely being published, even by potentially great institutions. Much inaccurate and unscholarly publication has seriously injured taxonomy; the same tendency intensified has cheapened ecology; and, unless we take the

utmost pains to verify all compilations and to publish only what we have carefully studied and digested, we shall soon cheapen and discredit phytogeography as well. With two such splendid models constantly before him as Stone's *Plants of Southern New Jersey*[1] and the Connecticut Botanical Society's *Catalogue of the Flowering Plants and Ferns of Connecticut*,[2] it is most unfortunate that the author of the *Flora of the Vicinity of New York* did not rise to the standard of accurate scholarship which has rendered authoritative the pages of those monumental volumes.— M. L. Fernald.

Viola septentrionalis in British Columbia.— In the Gray herbarium there are two interesting specimens of *Viola septentrionalis* from along the boundary line between Washington and British Columbia. One was collected "in marshes, Pend Oreille River," by Dr. Lyall, who accompanied the "Oregon Boundary Commission" in 1861; it was sent to Dr. Gray from the Kew herbarium as *V. cucullata*. In Piper's Flora of Washington this is cited [3] as *V. cuspidata* Greene — a synonym of *V. sororia* Willd., known no farther northwest than eastern Minnesota. Lyall's specimen is in petaliferous flower, and its strongly ciliate sepals, its lanceolate stipules sparsely bordered with gland-tipped hairs, and its cordate-deltoid leaf plainly mark it as *V. septentrionalis* instead of *V. sororia*.

The second specimen is from the herbarium of the Geological Survey of Canada, no. 63,518, J. M. Macoun collector, June 30, 1902, "alluvial woods flooded in spring, Cascade B. C." — a town on the international boundary only 20 miles west of Dr. Lyall's station. Macoun's plant is in various stages of fruit from cleistogamous flowers, and is in all respects characteristic *V. septentrionalis*, as heretofore known from eastern Ontario to Newfoundland, south to Central New York and southern New England.

If but one of these specimens were in evidence, the suspicion might arise that by some accident the label had become attached to the wrong specimen. But with two specimens from stations only 20 miles apart, collected independently by two expert botanists, the suspicion is inadmissible. The two reports are reciprocally confirmatory. Moreover, for this remarkable extension of range there are numerous

[1] See Rhodora, xiv. 94 (1912).
[2] See Rhodora, xii. 131 (1910).
[3] Contrib. U. S. Nat. Herb. **11**: 392.

precedents. We have now a list of about 200 flowering species that extend along the Canadian border across the continent. In the genus *Viola* we may mention *V. adunca*, *V. nephrophylla*, *V. palustris*, *V. renifolia*, and *V. Selkirkii*. It is not improbable that stations intermediate between eastern Ontario and British Columbia will be discovered for *V. septentrionalis*.— Ezra Brainerd, Middlebury, Vermont.

Two Extensions of Range in Gramineae.— During the past collecting season, I noted the following grasses somewhat outside their recorded ranges: — Bromus Kalmii Gray. In low, sandy woods in the valley of the Little Androscoggin River, Oxford, Maine. Apparently not hitherto reported east of Middlesex County, Mass., whence it is recorded, as an introduced plant at Malden, in the Flora of the Boston District (Rhodora, xv. 148). In the same patch of woods at Oxford grows *Lupinus perennis*, also near its northwestern limit there.

Panicum Commonsianum Ashe. In dry, loose sand at two stations, Dennis, Mass. I am indebted to Prof. Hitchcock for the determination of these specimens. The species probably occurs also in the adjoining town of Harwich, but the plants there were collected too late in the season for certain identification. It is known from Long Island and from three localities in sand-plain regions of Connecticut but, so far as I am aware, has not been previously reported from Massachusetts. Both the Dennis stations were along old and little-used wood-roads. Situations of this general character, where original conditions have been altered and the soil more or less disturbed, offer favorable ground for the growth of certain species of *Panicum*. *P. strictum* Pursh (*P. depauperatum* Muhl.) and species of the *huachucae* alliance often flourish mightily in recent clearings or where woods have been burned over. On Cape Cod there are many old excavations from which sand for the making of cranberry bogs has been taken, and the sides and bottoms of these sometimes furnish good *Panicum* collecting. The only stations for *P. umbrosum* LeConte (*P. Ashei* Pearson) and *P. barbulatum* which I have seen on the Cape are in such excavations.— C. A. Weatherby, East Hartford, Connecticut.

A Northern Solidago in the White Mountains.— To the steadily increasing number of northern plants found in the White Mountains may now be added *Solidago rugosa*, Mill., var. *villosa* (Pursh) Fernald.[1] This plant I noticed on 3 September, 1914, growing abundantly in a large clump beside the Mt. Washington Carriage Road below the junction of the Raymond Path (Sargent's Purchase, N. H.), and a specimen (*A. S. Pease*, no. 16305) has been placed in the Herbarium of the N. E. Botanical Club. Further search, for which at the time I had no opportunity, may reveal the plant at other points along the Carriage Road or in similar habitats elsewhere in the region. — Arthur Stanley Pease, Urbana, Illinois.

A Teretological Specimen of Panicum amarulum Hitchc. & Chase.— Three specimens of this species collected at Miami, Florida, in 1904, by J. M. Westgate, have panicles bearing transformed spikelets in which the glumes are multiplied to as many as 15, producing much the appearance of *Glyceria canadensis* or species of *Tridens*. These densely crowded scales are empty, but at the summit of the spikelets are usually one or two staminate florets in form like the staminate florets of the normal spikelets. None of these transformed spikelets bears fertile florets. The panicles bear a few apparently normal spikelets but examination of these shows only staminate florets. This multiplication of glumes is frequently found in species of the allied genus *Ichnanthus* but we have not before observed it in any species of *Panicum*.— Agnes Chase, Department of Agriculture, Washington, D.C.

[1] The seventh edition of Gray's Manual, 794, gives the range of this variety as "from Lab. and w. Nfd. to w. Que. and n. Me."

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S F. Blake del.

Fig. A. Sabatia difformis (L.) Druce. Fig. B. S. campanulata (L.) Britton. Fig. C. S. obtusata Blake.

Rhodora

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RUMEX PERSICARIOIDES AND ITS ALLIES IN NORTH AMERICA.

Harold St. John.

(Plate 113.)

Several collections of the annual *Rumex persicarioides* and a nearly related species from about the Gulf of St. Lawrence have led to a study of these species and their allies. Through the courtesy of the curators I have been able to study the collections of this group in the herbaria of the Academy of Natural Sciences of Philadelphia, Yale University, and the Missouri Botanical Garden. I wish here to express my gratitude to these gentlemen, Mr. Stewardson Brown, Mr. A. F. Hill, and Dr. J. M. Greenman.

Along the borders of salt marshes and brackish ponds on Prince Edward Island grows a fleshy annual *Rumex* remarkable for the large straw-colored tubercles borne on the valves and for the plane, linear, cordate-based leaves. This plant tallies perfectly with Linnaeus's description in the *Species Plantarum* of *Rumex persicarioides*.[1] It is characterized, in contrast with *R. maritimus* which follows it directly in this work, by having large, pale tubercles borne on each valve, "*valvulae . . . ., omnes tectae granis pallidis magnis.*" "*Habitat in* Virginia." These large pale tubercles are the most conspicuous character of this plant of Prince Edward Island, other parts of the lower St. Lawrence system, and Cape Ann, Massachusetts.

In order to make this identification doubly sure, Mr. Sidney F. Blake has been kind enough to examine the type for me, and to send

[1] L. Sp. Pl. 1. 335 (1753).

me sketches and a description of it, saying: "*R. persicarioides* is represented in the Linnaean Herbarium by two sheets. The specimen collected by Kalm, which bears no indication of locality, is a tiny procumbent plant about a dm. high with narrowly lance-oblong leaves, not noticeably cordate at the base (but badly crumpled), and small fruiting calyx bearing three large, almost reticulate grains (now brownish, but apparently pale when fresh) which almost entirely conceal the tiny valves, which bear two or three curved teeth. For the most part the teeth are very inconspicuous and I had something of a search to find one fit to sketch."

In the Gray Herbarium is a fragment, marked in Gray's handwriting "*Rumex persicarioides* (K) Hb. Linn." It is a mere scrap from a lateral branch of the inflorescence, giving no hint of the leaf characters, but it does show the swollen, elliptic-ovate tubercles so characteristic of the plant of Prince Edward Island. As to the locality where Kalm found this plant, there is no indication on the label. We know, however, that Kalm on July 23, 1749, started from Lake Champlain for Montreal following for some distance the Richelieu River and that during August and September of the same year he journeyed down the St. Lawrence River to Bay St. Paul, far below the limit of tide-water.[1] Diagonally across the river from here, at Cacouna, *Rumex persicarioides* is definitely known; and quite recently Bro. Marie-Victorin has collected it in Chambly, P. Q. He writes that a colony of the plants were growing on one of the small islands in Chambly Basin of the Richelieu River, midway between Lake Champlain and the St. Lawrence. It seems quite probable, then, in spite of Linnaeus's cited locality "Virginia," that Kalm found his specimens at some such place on the Richelieu River or the lower St. Lawrence, the region where we now know the species in its greatest abundance. In view of their perfect agreement there seems little doubt of the identity of the fragment in the Gray Herbarium with Linnaeus's type.

Quoting Mr. Blake again, "The second specimen was raised at the Upsala Garden from seed collected by Kalm, and, while a much taller plant (about 2.5 dm.) with more elongate internodes, it is in all its characters identical with the specimen of Kalm. The interesting fact concerning this H[ortus] U[psalensis] plant is that the label is

[1] Kalm, Reise nach nordlichen Amerika, iii. 517–525 (1754).

marked 'canade' (nsis)." Mr. Blake, then, confirms my surmise that Kalm's original collection was probably not made in "Virginia," but somewhere on the St. Lawrence system.

The earlier floras of our country, as that by Pursh,[1] credit *Rumex persicarioides* to "shady wet woods, on the banks of ditches; Virginia and Carolina": and these records have been continued by the more recent Manuals. I have seen no specimen from the Atlantic coast from further south than Cape Ann, Massachusetts, nor have I found any convincing records of it to the southward. The plant as I know it about the Gulf of St. Lawrence grows on the salt marshes and along the saline shores, not "in shady wet woods." The improbable habitat given by Pursh and the fact that no specimens are known from further south than Massachusetts makes the records from "Virginia and Carolina" very questionable.

Now let us consider the identity of the other annual *Rumex* of the Gulf of St. Lawrence, a plant widely distributed in America and for many years passing as *R. maritimus* L., but generally treated in recent years (following Trelease) as *R. persicarioides*.

In the *Species Plantarum*, *Rumex maritimus* is defined in very few words:[2] valves toothed, bearing tubercles, leaves linear. Habitat on the saline shores of Europe. This description follows directly after that of *R. persicarioides*, yet there is no mention of the leaves having wavy margins or truncate bases. Mr. Blake has been kind enough to help in interpreting this plant also: "The type of *R. maritimus* is an erectish plant about 2.5 dm. high with narrowly lance-oblong leaves, cuneate at base, rhombic-lanceolate valves with about three conspicuous cusp-teeth on each side, longer than the breadth of the valves, and lance-oblong grains much narrower than the valves which bear a few strong reticulations. It is obviously the *R. persicarioides* of Gray's Manual ed. 7 p. 357." As shown by numerous plates and by authentic specimens this common plant of the saline shores and alkaline plains of Eurasia has the leaves plane, narrowly linear; and the sharp pointed tubercles lanceolate in outline.

The American plant, ranging from the Gulf of St. Lawrence southward along the Atlantic coast to southern New England, and from Wisconsin and Illinois westward to British Columbia and Lower

[1] Pursh, Fl. Am. Sept. i. 248 (1814).

[2] "RUMEX floribus hermaphroditis: valvulis dentatis graniferis, foliis linearibus. *Habitat in* Europae *litoribus maritimis.*" L. Sp. Pl. i. 335 (1753).

California is very like the European *R. maritimus* and indistinguishable from it in fruit- and flower-characters, but with a very marked and almost constant tendency to have the leaves cordate or truncate at base and often wavy or undulate along the margins.

Occasional specimens of the American plant show the development of a third bristle on each side of the valve,[1] and this was taken by Trelease as one of the characters separating the American "*R. persicarioides*" from the Eurasian *R. maritimus*. This character, however, is not constant on any one plant or on the plants from any one region, or in conjunction with any other character. For this reason this tendency is not worthy of special recognition in the American plant, when as a matter of fact, the Linnaean type, as described by Mr. Blake, has the valves with "about three conspicuous cusp-teeth on each side."

Since the common North American plant, although indistinguishable in fruit from the European *R. maritimus*, differs from the old-world plant in the cordate- or truncate-based and usually undulate leaves, it seems worthy of varietal rank under *R. maritimus*.

Thinking that it would be very strange if this plant, so common over most of North America, did not have a valid name, I have searched the literature and find that in 1895 Philippi described a *Rumex fueginus*.[2] He characterized this plant from eastern Fuegia as having "leaves all linear, truncate at base," and in the other characters his description is quite applicable to our North American plant, except that only one valve bears a tubercle.

Five years later Dusén [3] reduced Philippi's species to a variety of *R. maritimus* L., commenting that, "although my specimens differ from Philippi's description in so far that all the sepals bear callosities, I have no hesitation in putting *Rumex fueginus* here, as the agreement is otherwise complete."

In his revision of *Rumex* Trelease [4] reduces to synonymy under "*R. persicarioides* L.," which, as I have shown, should now be treated

[1] Trelease, 3d Ann. Rep. Mo. Bot. Gard. 94 (1892).

[2] "foliis omnibus petiolatis, linearibus, basi truncatis,....valvulae....., unica callifera." Philippi, Anales Univ. Chile, xci. 493 (1895).

[3] "**Rumex maritimus** L. var. **fuegina** [us] (Phil.) — Obschon mein Exemplar insofern von Philippi's Beschreibung des *Rumex fueginus* abweicht, dass sämmtliche innere Perianthblätter Schwielen tragen, so hege ich kein Bedenken, da die Übereinstimmung sonst vollständig ist, dieselbe zu dem *Rumex fueginus* Phil. zu ziehen." P. Dusén, Svenska Expd. till Magellansländerna, iii. No. 5, 194 (1900).

[4] Trelease, l. c.

as *Rumex maritimus*, var. *fueginus*, a plant described from Kentucky by Michaux [1] as *R. crispatulus*. This is depicted as "with the lower leaves oval, the upper lanceolate, all crisped on the margin, undulate; the inflorescence leafless; the fruiting calyx with obtuse cordate valves, tufted on either side, tridentate, one valve naked, the other two unequ lly grain bearing." Trelease comments that this "is the form [of *R. persicarioides*] with broadest most wavy leaves, more naked inflorescence, and larger valves, only two of them bearing unequal callosities; but a study of the many forms growing intermingled about St. Louis, has not shown the wisdom of maintaining it even as a variety." Prof. Fernald has examined the type of *Rumex crispatulus* in the Michaux Herbarium and has noted that this specimen is *R. obtusifolius* L. The oval leaves, the leafless inflorescence, the unequal callosities, and the locality, Kentucky, far distant from the known range of *Rumex maritimus* var. *fueginus*, all make this disposition of Michaux's species quite satisfactory.

At first thought, the distribution of *Rumex maritimus*, var. *fueginus* seems to be very peculiar, growing as it does from the Gulf of St. Lawrence south to Rhode Island,[2] and from the southern end of Lake Michigan northwestward to British Columbia and southwestward to Lower California, and reappearing on the southern tip of South America,[3] in eastern Patagonia and Tierra del Fuego. My search for specimens or trustworthy records of the plant from Mexico proper, Central America, and the northern part of South America has been in vain.

The great similarity between the floras of the southern tip of South America and parts of North America has been known for a long time. As early as 1881 Gray and Hooker [4] pointed out the identity of the genera and in many cases the species growing in these widely separated areas.

The traditional explanation of this wide disruption of similar floras

[1] Michx. Flor. Bor. Am. i. 217 (1803).

[2] The records of this plant from the southern Atlantic coast, as well as of *R. persicarioides*, which has so often been confused with it, seem to be very doubtful. No specimens have been seen from further south than Block Island, off the entrance to Narragansett Bay. For comments see Stone, Plants of Southern New Jersey, 421 (1911). Specimens of the European *R. maritimus* are occasionally found on the ballast lands near the large ports of our southern Atlantic coast.

[3] See W. J. Hooker, Flor. Bor. Am. ii. 130 (1838).

[4] A. Gray & J. D. Hooker, Vegetation of the Rocky Mountain Region; Bull. U. S. Geog. Surv. vi. no. i (1881).

is the probable climatic changes induced by the advance of the Pleistocene glaciers from the Arctic until they covered the larger part of North America, with the inevitable driving south of the flora and fauna to points whence it was possible for the boreal types to cross along the Cordilleras to South America. Finally, in the period of ameliorating climate accompanying or following the withdrawal of the glaciers, these plants, in order to maintain themselves in a suitable climatic zone, migrated towards either pole. This explanation seems satisfactory enough for the boreal genera and species, because a mere land connection between Patagonia and temperate North America is not enough; the climatic conditions prevailing over it needing to be such as to allow the aretic plants to migrate across. In order fully to justify this theory we should expect to find isolated on some of the higher mountains of Central America species which occur in temperate North America and Patagonia, or some that are found in North America, but which did not succeed in making the journey to Patagonia. Such occurrences have been frequently demonstrated, as in the case of "the presence of *Cystopteris fragilis* and *Phleum alpinum* at an altitude of 12,000 feet on Mt. Orizaba in southern Mexico" [1] and other similar cases. Both of the species cited occur in the cooler parts of North America and at the southern tip of South America.

A more recent theory [2] is interesting in this connection: Scharff argues that this relationship between the two widely separated areas, North America and southern South America, is the result of a much more ancient dispersal including in the animal kingdom earthworms, slugs, salamanders, and mammals,[3] and occurring "probably during the dawn of the Tertiary Era." Geological charts illustrating the supposed land-areas during the Cretaceous and early Tertiary show a now obliterated land connection [4] between the western coast of North America at first with the southern tip of South America, and later with the northern part of the west coast of South America. Sharff's most convincing argument for such a migration in Cretaceous or early Tertiary times is a quotation from Prof. Berry [5] "that in mid-Cretaceous times seventy-five percent of the known plants of Argentina were characteristic types of the Dakota-group flora of North America."

[1] Fernald, Rhodora iv. 150 (1902).

[2] Scharff, Distrib. and Orig. of Life in Am. 413–419 (1912).

[3] Also "the genus *Carabus*, flightless beetles," Gadow, Wanderings of Animals, 90 (1913).

[4] Scharff, l. c. 280, 294, and Gadow, l. c. maps 11 and 12.

[5] Scharff, l. c. 414.

Regarded from this angle, it can be seen that all our known stations for *Rumex maritimus* var. *fueginus* lie near the line of the Cretaceous or early Tertiary sea coasts, and it is significant that a few other plants have a somewhat similar, but not identical distribution. *Distichlis spicata*, credited to Patagonia by Macloskie [1] on the basis of a report by John Ball, but not seen by me, is found otherwise only in North America; but it there extends down the Atlantic coast to Florida and appears on some of the Antilles and in Mexico. *Ranunculus Cymbalaria* has a range in North America somewhat similar, but in South America is found in the Andes as far north as Ecuador. This species, however, is somewhat circumpolar in distribution, occurring in widely separated sections of Asia.

However strong the evidence from the animal kingdom may be, we do not seem to find sufficient confirmation in the plant kingdom to demonstrate conclusively that the discontinuous distributions, such as that of *Rumex maritimus* var. *fueginus*, must have been brought about by a Cretaceous or early Tertiary land bridge outside the present limits of America, as is argued by Scharff. Until we know better the flora of western South America it seems safer to infer that the *Rumex* may sometime be found, like *Ranunculus Cymbalaria*, among the Andes of Central, or northern South America, and to think that, of the two interpretations above outlined, at least in the case of the higher plants, the one advocated by Hooker, Gray and many others, is the more probable explanation.

In arid parts of western America,— Utah, Lower California, and eastern Washington — a plant closely simulating *R. maritimus* var. *fueginus* has been found, which has the bristles of the valve nearly or entirely obsolete. Although but scantily represented in herbaria this seems worthy of recognition. It is possible that this is the plant described by Watson as *R. salicifolius* var. (?), Wats. Bot. King Exp. 314 (1871), as is implied by Trelease,[2] but Watson's material has not been seen by the writer.

RUMEX MARITIMUS L., var. **athrix**, n. var., *R. maritimum*, var. *fueginum* foliis lineari-lanceolatis cordatis vel basi truncatis simulans sed differt setis valvularum obsolescentibus vel absolute deficientibus. — TYPE, *M. E. Jones*, no. 5839, clay, altitude 5400 feet, Vermilion, UTAH.

[1] Macloskie, Princeton Exped. to Patagonia viii. pt. 5, sect. 1, 218 (1904).
[2] Trelease, l. c. 94.

Growing as a native in Europe and occasionally as an adventive in America is *Rumex limosus* Thuill., which is closely allied to *Rumex maritimus*. The former is variously interpreted as a hybrid or as a distinct species, depending solely on the point of view of the author, since no experimental verification of this point has been made. *Rumex limosus* seems to be recognizable by the separation of the inflorescence into distinct glomerules, the swollen, campanulate tip of the pedicel, and the greater proportional breadth of the valves.

Key to the American Members of this Group.

A. Tubercles turgid, elliptic-ovate in outline, pale straw-colored; length of the bristles about equal to the breadth of the valves. . . *R. persicarioides*.
A. Tubercles linear-lanceolate in outline, brown, or tinged with red; bristles, when present, 1.5–2 times as long as the breadth of the valves.
B. Medial cauline leaves linear-lanceolate, cuneate at base, plane, Eurasian. . . . . *R. maritimus*.
B. Medial cauline leaves broadly lanceolate or linear-lanceolate, cordate or truncate at base, often crisped on the margin, American.
C. Bristles present, 1.5–2 times as long as the breadth of the valves. *R. maritimus* L., var. *fueginus*.
C. Bristles nearly or completely wanting. *R. maritimus* L., var. *athrix*.

In the following citation of specimens the parenthetical letter indicates the Herbarium in which these specimens may be found: (A) = Academy of Natural Sciences of Philadelphia; (H) = Gray Herbarium; (M) = Missouri Botanical Garden; (N) = New England Botanical Club; (Y) = Eaton Herbarium, Yale University.

Rumex persicarioides L. Sp. Pl. i. 335 (1753), not Trelease, 3d Ann. Rep. Mo. Bot. Gard. 93 (1892), and subsequent American authors.— Quebec: island of the Richelieu, Chambly, August, 1914, *Bros. Rolland & Victorin* no. 562 (H); margin of a salt marsh, Cacouna, August 31, 1904, *J. F. Collins* and *M. L. Fernald* (H). Prince Edward Island: edge of a salt marsh, Malpeque, August 20, 1914, *Fernald* and *St. John*, no. 11,038 (H); wet brackish sand, Grand Tracadie, August 31, 1912, *Fernald, Long*, and *St. John*, no. 7,341 (H), August 22, 1914, *Fernald* and *St. John*, no. 11,039 (H); border of salt marsh, Bunbury, August 9 and 28, 1912, *Fernald, Long*, and *St. John*, nos. 7,338 and 7,340 (H). Massachusetts: sandy cove, Bay View, Gloucester, August 15, 1897, *E. F. Williams* (H & N), and *W. P. Rich*, (H).

Rumex maritimus L. Sp. Pl. i. 335 (1753); Rouy et Fouc. Fl. Fr. xii. 78 (1910); Asch. und Graeb. Syn. iv. 702 (1912); Reichenb. Ic. Fl. Germ. xxiv. t. 186 (1909). An adventive in America. New

JERSEY: ballast, Camden, August 14, 1874, *C. F. Parker*, no. 6,909 (M & Y). PENNSYLVANIA: waste land, Philadelphia (A).

RUMEX MARITIMUS L., var. FUEGINUS (Phil.) Dusén, Svenska Exped. till Magellansl. iii. no. 5, 194 (1900). *R. fueginus* Phil. An. Univ. Chil. xci. 493 (1895). *R. persicarioides* of Trelease, 3d Ann. Rep. Mo. Bot. Gard. 93 (1892); Gray's Man. ed. 7, 357 (1908); Britton and Brown, Ill. Fl. ed. 2, i. 659; and recent American authors, not L.— QUEBEC: wet brackish sand or mud at the margin of a pond southwest of Etang du Nord village, Grindstone Island, Magdalen Islands, August 15, 1912, *Fernald, Long,* and *St. John,* no. 7,339 (H). NOVA SCOTIA: Sable Island: marsh by lagoon, July 29, 1899, *John Macoun,* no. 22,594 (H); and *St. John,* 1893, nos. 1204, 1205, 1206, 1207, 1208 (H). MAINE: Fort Popham, Phippsburg, September 14, 1907, *Kate Furbish* (H & N); sandy soil, henyard, Cumberland, July 23, 1902, *E. B. Chamberlain,* no. 421 (H & N); stagnant brackish ditch along railroad, Pine Point, Scarborough, August 10 and 13, 1898, *J. C. Parlin,* no. 1,072 (H & N). MASSACHUSETTS: Charlestown, July or August 1881, *C. E. Perkins,* no. 709 (N); S. Boston flats, July 10, 1879, *C. E. Perkins,* no. 538 (N); Falmouth, *W. G. Farlow* (Y); Marthas Vineyard, September, 1825, *Oakes* (H); Nantucket: September 1825, *Oakes* (H); Sachacha Pond, August 18, 1878, *C. E. Faxon* (H); August 1885, *L. L. Dame,* (Y); 1886, *L. L. Dame* (N); Sesachaca Pond, July 1886, *L. L. Dame* and *C. W. Swan* (Y); Notown, Penikees Island, August 5, 1904, *A. H. Moore,* no. 1,917 (N). RHODE ISLAND: salt marsh, Newport, July, 1877, *Frank Tweedy* (Y); stony shore of reservoir, Newport, September 21, 1901, *W. P. Rich* (H); Block Island, October, 1825, *Robbins* (H). Among the plants from the western part of the range the following can be cited as typical. WISCONSIN: Lake Pepin, 1861, *T. J. Hale* (M no. 46, 565). ILLINOIS: Stony Island, Chicago, July 25, 1909, *J. M. Greenman,* no. 2,805 (M); lake near Centreville, June 22, 1891, *E. Douglass* (M no. 46,605); Woodstock, 1860, *Geo. Vasey* (H & Y); sandy ground n. E. St. Louis, July 30, 1878, *H. Eggert* (M nos. 46,598 to 46,601). MISSOURI: banks and sand bars of the Mississippi, St. Louis, September, 1839, *Dr. Geo. Engelmann* (M no. 46,555); Jackson County, August 23, 1890, *B. F. Bush,* no. 2,142 (M). MINNESOTA: St. Cloud, September, 1892, *F. W. Dewart* (M no. 46,607); Fort Snelling, June 26, 1891, *Edgar A. Mearns* (H); low damp soil, Luce, Ottertail County, August 6, 1912, *Rev. Z. L. Chandonnet* (H). IOWA: Lake Edwards, Hancock County, September 10, 1895, Coll. *B. S.* (M no. 46,591). NORTH DAKOTA: borders of swamps, Leeds, August 2 and September 1, 1899, *Dr. J. Lunell* (H). SOUTH DAKOTA: low places, Vermillion, Clay County, September 11, 1911, *S. S. Visher,* no. 4,127 (M); old lake bottom, Windsor, Brookings County, July 27, 1903, *A. G. Johnson* (M no. 46,580). NEBRASKA: river banks on Middle Loup River, near Thedford, Thomas County, August 29, 1893, *P. A. Rydberg,* no. 1,572 (H); meadow, Collins, August 23, 1901, *H. P. Baker* (M); along

streams, Nuckolls County, August 1896, *Geo. G. Hedgcock* (M no. 46,574). Kansas: stream banks, Riley County, July 1897, *R. H. Pond*, no. 1,143 (H & M); Manhattan, *J. B. S. Norton*, August 3, 1893 (M no. 46,592). Montana: not rare, in alkali spots, Bozeman, August 31, 1898, *J. W. Blankinship* (M no. 46,609). Idaho: Blue Creek, Coeur D'Alene Mountains, altitude 750 meters, July 20, 1895, *John B. Leiberg*, no. 1,326 (H & M); wet places near Granite Station, Kootenai County, July 29, 1892, *J. H. Sandberg, D. T. MacDougal*, and *A. A. Heller*, no. 778 (H); bogs, altitude 2,200, Falk's Store, Canyon County, June 28, 1910, *J. Francis Macbride*, no. 310 (H & M). Wyoming: bogs, Mammoth Hot Springs, Yellowstone Park, August, 1884, *Frank Tweedy*, no. 24 (Y); damp soil, elevation 4,000–5,000 feet, September 1900, *Frank Tweedy*, no. 3,268 (Y); Dubois, August 10, 1894, *Aven Nelson*, no. 769 (H). Colorado: Powell's Exploring Expedition, 1868, *Dr. Geo. Vasey*, no. 500 (M & Y); Sloan's Lake, September 6, 1910, *Alice Eastwood*, no. 105 (H & M). Utah: alkaline marshes, Rabbit valley, altitude 6,800 feet, August 18, 1875, *L. F. Ward*, no. 598 (M); June–July 1869, *D. C. Eaton*, no. 291 (Y). Nevada: Ruby valley, near Cave Creek Post Office, Elko County, elevation 6,000 feet, August 21, 1908, *A. A. Heller*, no. 9,526 (M); U. S. Geological Exploration of the 40th Parallel, Truckee Valley, August, 1867, *W. W. Bailey*, no. 1053 (H & Y). New Mexico: wet marshy places in pastures, Santa Fe, August 8, 1847, *A. Fendler*, no. 762 (H & M); Fort Union, *Hayden* (M no. 46,573). Lower California: Tigüana, September 1884, *C. R. Orcutt* (M no. 46,623); mountains, Northern part, July 8, 1885, *C. R. Orcutt* (M no. 46,622). California: Bear Valley, San Bernadino Mountains, altitude 6,500 feet, June 24, 1894, *S. B. Parish*, no. 3,059 (M); moist places near Soldiers Home, Los Angeles County, June 20, 1902, *Le Roy Abrams*, no. 2,573 (H & M); San Luis Obispo, June 26, 1876, *E. Palmer*, no. 459 (M & Y); near San Francisco, 1891, *Mrs. Brandegee* (M no. 46,619). Oregon: near mouth of Williamson River, 1,440 m., August 12, 1894, *J. B. Leiberg*, no. 711 (H & M); near a spring on a deserted ranch, "The Meadows," Wallowa County, altitude 4,250 feet, August 18, 1897, *E. P. Sheldon*, no. 8,718 (M). Washington: Mission, August 22, 1902, *Frank O. Kreager*, no. 484 (M); Olympic Mountains, Clallam County, July 1900, *A. D. E. Elmer*, no. 2,684 (M). British Columbia: Vicinity of Victoria, Vancouver Island, July 24 and August 17, 1893, *John Macoun*, nos. 1,567 and 1,566 (M); Kamloops, June 17, 1887, *John Macoun* (M no. 46,625). Alberta: National Park, Banff, August 14, 1891, *Macoun* (M no. 46, 613). Saskatchewan: Palliser's British North American Exploring Expedition 1857–8, *E. Bourgeau* (H); Cd. (Cumberland) House Ft. 1825, *Dr.* (*ummond*) (H).

Rumex maritimus L. var. athrix St. John.— Utah: Clay, altitude 5,400 feet, Vermilion, August 20, 1894, *M. E. Jones*, no. 5,839 (type in Missouri Botanical Garden and Gray Herbarium). Lower California: Ensenada, August 31, 1889, *Orcutt* (M no. 46,621).

Specimens approaching this variety have been seen from COLORADO: on dry sandy ground at 8,000 feet, Parlin, Gunnison County, August 12–20, 1901, *B. H. Smith* (A). WASHINGTON: Philleo Lake, Spokane County, August 14, 1889, *W. N. Suksdorf*, no. 943 in part (A. & M).

HARVARD UNIVERSITY.

EXPLANATION OF PLATE 113.

Rumex maritimus L. drawn from Flora Exsiccata Austro-Hungarica no. 1,013, Austria inferior, in paludosis ad Maria-Lanzendorf in agro Vindobonensi, 180 mt. s. m. *Heimerl.*

Fig. 1. Mature fruit, × 10.

Fig. 2. Median cauline leaf, × 1.

Rumex maritimus var. *fueginus* (Phil.) Dusén drawn from *Fernald, Long,* and *St. John,* no. 7,339, wet brackish sand or mud at the margin of a pond southwest of Étang du Nord village, Grindstone Island, Magdalen Islands, Quebec, August 15, 1912.

Fig. 3. Median cauline leaf, × 1.

Fig. 4. Mature fruit, × 10.

Rumex persicarioides L. drawn from *Fernald, Long,* and *St. John,* no. 7,340, border of salt marsh, Bunbury, Prince Edward Island, August 28, 1912.

Fig. 5. Median cauline leaf, × 1.

Fig. 6. Mature fruit, × 10.

AN ATRIPLEX NEW TO NORTH AMERICA.

S. F. BLAKE.

WHILE collecting during the late summer of 1913 on Miscou Island off the northeast coast of New Brunswick, the writer met with an *Atriplex* among the seashore sands whose appearance at once struck him as peculiar. The plants, which grew singly or in groups of three or four, never in colonies as the members of the *A. patula* complex so commonly do, were at once distinguishable from that species by their strongly prostrate habit, whitish stems, and dense grayish-white mealiness. Later in the summer a few plants of the same species were found on the shore of Fox Island, one of a chain of low sandy islets in Miramichi Bay. Subsequent herbarium study of the species, which was collected on Prince Edward Island so long ago as 1888 by John Macoun, and in 1912 in some abundance on the Magdalen Islands by Prof. Fernald and his companions, has shown it to be identical with the west European plant which, when not confused

with *A. laciniata* L., has generally passed as *A. arenaria* Woods, and has recently been treated as *A. sabulosa* Rouy by Moss & Wilmott [1] in their important revision of British Atriplices.

Although the diagnostic characters of this species are quite distinctive and make it unique among indigenous North American forms, the determination of the name by which it should be known is a matter of some difficulty. It apparently formed a part of the original *Atriplex laciniata* L.,[2] and was referred to by Linnaeus in the Flora Anglica [3] as *A. maritima*, a name discarded by Moss & Wilmott as a *lapsus calami*, Woods [4] in 1849 published the plant as a new species under the name *A. arenaria*, replaced by Rouy [5] in 1890 by *A. sabulosa* on account of the prior use of the name *A. arenaria* by Nuttall [6] for a related species of our eastern American coast. The name *Atriplex maritimum* had in the meantime been independently given to the species by Ernst Hallier in a revision of the Atriplices of Heligoland. According to International Rules, Hallier's name should be used for the plant in view of the fact that the three previous uses of this binomial are untenable.[7]

In the Index Kewensis Rafinesque's *Atriplex mucronata* [8] is referred to *A. arenaria* Nutt. If this were correct the name would require adoption for the latter species, and Woods's *A. arenaria* would then be available for the present plant. But the method of publication of *A. mucronata* does not seem to the writer to justify its adoption, although a specimen of *A. arenaria* Nutt. from "maritime New York" in the Prodromus Herbarium, labeled *A. mucronata* by Rafinesque himself, shows that the name was intended by him to apply to that species. It was merely mentioned incidentally by Rafinesque in a review of Pursh's Flora: "His Atriplex halimus, A. laciniata, A. hastata, are different from the European species and have been called A. halimoides, A. mucronata, and A. dioica by Rafinesque." Names so

[1] Moss & Wilmott in Moss, Cambr. Brit. Fl. ii. 179. t. 185 (1914), q. v. for full synonymy.

[2] Linn. Sp. ii. 1053 (1753).

[3] Linn. Fl. Angl. 25 (1754).

[4] Woods, Phytol. iii. 593 (1849).

[5] Rouy, Bull. Soc. Bot. Fr. xxxvii. p. xx (1890).

[6] Nutt. Gen. i. 198 (1818).

[7] *A maritima* L. l. c. is considered by Moss & Wilmott to have been adopted by Linnaeus from Ray through a lapsus, an interpretation which seems justified by the fact that the name was never afterwards used by Linnaeus; *A. maritima* (L.) Crantz, Inst. i. 208 (1766) is *Suaeda maritima* (L.) Dumort.; *A. maritima* Pall. Reise ii. 289 (1773) is a mere nomen.

[8] Raf. Am. Month. Mag. 176 (Jan. 1818).

published, if tenable at all, are only so through reference to a previously published description; but the description of *A. laciniata* by Pursh,[1] copied by him from Willdenow,[2] is quite inapplicable to *A. arenaria* Nutt., although the range allotted to the plant by Pursh indicates that species. Pursh's description runs thus: "A. caule erecto herbaceo, foliis triangularibus profunde dentatis subtus albidis, calycibus fructus rhombeis trinerviis denticulatis." The plant to which this character applies is the true *A. laciniata* L., not known in America, although a near relative, *A. rosea* L., occurs as a rare ballast plant within the range assigned by Pursh. *Atriplex laciniata* L. was based by Linnaeus on several references, of which the only American is from Gronovius's Flora Virginica. The Clayton plant on which Gronovius's reference is based is apparently no longer in existence, neither Mr. A. J. Wilmott nor the writer having been able to discover it in a search through all the material of *Atriplex* in the British Museum. In any case Rafinesque's name cannot be adopted for *A. arenaria* Nutt., having been based on a published description whose characters disagree with those of that species in nearly every point.

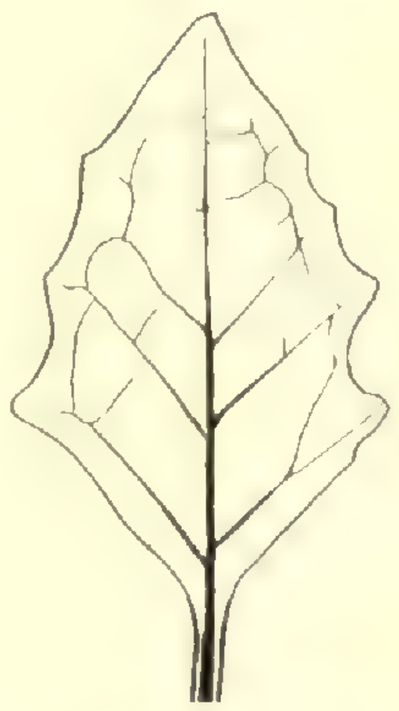


Fig. 1. Atriplex maritima. Leaf × 1.

Atriplex maritima is an interesting addition to the gradually increasing number of coastal and maritime species mainly of west European range which occur also on the northeast coast of North America. It may be identified by the following description.

ATRIPLEX MARITIMA E. Hallier, Bot. Zeit. xxi. Beilag [1] 10 (1863), as *A. maritimum*, not Crantz nor Pall.; *A. arenaria* Woods, not Nutt.; *A. sabulosa* Rouy. Prostrate annual, branched from the base, the branches sometimes 0.6 m. long; stem whitish, slightly grooved, lepidote-farinose, at length subglabrate; branches and branchlets subopposite below, alternate above; leaves rhomboid-ovate, obtuse or subacute, mucronate, irregularly crenate-dentate above the cuneate base with about 6–10 triangular obtuse teeth, the lowest pair generally larger, permanently whitish-lepidote-farinose both sides, more densely so beneath, 1.5–3 cm. long, 1–1.9 cm. wide, on unmargined whitish petioles 2–4 mm. long; flowers in clusters of 1–6 in the axils of nearly all the leaves, not forming spikes; fruiting calyx rhombic, broadly cuneate at base and apex, broadest at the middle, there with 1–3 low

Fig. 2. Atriplex maritima. Fruiting bract × 1.

[1] Pursh, Fl. i. 199 (1814).

[2] Willd. Sp. iv. 963 (1806).

triangular teeth on each side, 3-nerved and strongly reticulate, often with a few conical appendages on the back, whitish and coriaceous at base when fully ripe, membranous-herbaceous above, distinctly whitish-lepidote-farinose, 6–9 mm. long, 6.5–8 mm. wide, occasionally with a short distinct pedicel.—New Brunswick: sandy beach, Miscou Harbor, Miscou Island, Gloucester County, 27 Aug. 1913, *Blake* 5565 (Gray Herb.); beach, Fox Island, Miramichi Bay, Northumberland County, 18 Sept. 1913, *Blake* 5692 (Gray Herb.). Prince Edward Island: Brackley Point, 6 Aug. 1888, *J. Macoun* (Brit. Mus.). Quebec: damp brackish sandy beach, Grande Entrée, Coffin Island, Magdalen Islands, 20 July and 19 Aug. 1912, *Fernald, Bartram, Long & St. John*, nos. 7395, 7398 (Gray Herb.); dry sandy beach southwest of Étang du Nord wharf, Grindstone Island, Magdalen Islands, 25 July and 15 Aug. 1912, *Fernald, Bartram, Long & St. John*, nos. 7396, 7397 (Gray Herb.).

London, England.

The 20th annual Winter Meeting of the Vermont Botanical Club was held conjointly with the Vermont Bird Club at Burlington, January 29 and 30, 1915, with a good attendance. The sessions were held in the Williams Science Hall, University of Vermont.

Twelve botanical papers were read and discussed. The Vermont blackberries received attention in a talk by Dr. Ezra Brainerd of Middlebury on "New Stations in Vermont for Rare Forms of *Rubus*," and in a paper by Mr. A. K. Peitersen of the University of Vermont on "Some Problems in the Study of Vermont Blackberries."

Prof. George P. Burns of the University of Vermont told about "The Publication of the New Edition of the Vermont Flora" which is now in the printer's hands.

There were papers on "Plant Quarantine Laws," and "Susceptibility of Cruciferae to Club Root," by Prof. B. F. Lutman and Mr. G. A. Cunningham respectively, both of the University of Vermont, and one on the "Forest Fungi of Bethel," by Dr. Perley Spaulding of the U. S. Department of Agriculture.

The two clubs expect to unite at the next annual meeting and the officers elected this year were the same for both clubs; viz. Pres., Dr. Ezra Brainerd, Middlebury; Vice-Pres., Dr. Henry F. Perkins, Burlington; Sec., Prof. George P. Burns, Burlington; Treas., Mrs. Nellie F. Flynn, Burlington; Editor, Mr. George L. Kirk, Rutland; Librarian, Miss Phoebe M. Towle, Burlington.—Nellie F. Flynn, Burlington, Vermont.

Betula glandulosa Michx. var. **sibirica** (Ledeb.) n. comb.— *B. nana* Ledeb. Fl. Alt. iv. 247 (1833), not L. *B. rotundifolia* Spach, Ann. Sci. Nat. ser. 2. xv. 194 (1841). *B. nana* L. β. *sibirica* Ledeb. Fl. Ross. iii. 654 (1849–51). *B. glandulosa* Michx. var. *rotundifolia* (Spach) Regel in A. DC. Prod. xvi. pt. 2. 172 (1864).— The form of *Betula glandulosa* with prostrate or procumbent branches and orbicular or reniform-orbicular leaves was first distinguished by Spach as *B. rotundifolia*, based on a specimen in the Paris Herbarium collected by Ledebour in Siberia and labeled by him *B. nana*. I have not seen the type, but have examined specimens from the Altai, 1844, collected by Ledebour, in the Barbey-Boissier Herbarium near Geneva, likewise labeled *B. nana* by Ledebour himself, which are identical with the plant generally called *B. glandulosa* var. *rotundifolia*. There is also a specimen of this form in the British Museum from the shores of the Lena in Siberia, collected 12 May, 1882, by Bunge, and labelled *B. nana* L. var. *sibirica* Led. Ledebour's *B. nana* β. *sibirica* was based on *B. rotundifolia* Spach, and should be adopted, being much the older varietal name.— Sidney F. Blake, London, England.

Botrychium **angustisegmentum** (Pease & Moore), n. comb. *B. lanceolatum*, var. *angustisegmentum* Pease & Moore, Rhodora, viii. 229. (1906).— *Botrychium lanceolatum* (Gmel.) Ångstr. is a plant of boreal Europe, Asia, northwestern America and Greenland. In Europe the plant belongs to the Subarctic and Arctic-alpine floras, in northern Scandinavia and Finland, and locally in the Alps. In North America it occurs within the Arctic Circle in Greenland (latitude 63° N.) but is unknown elsewhere in the East; in the West it extends from the Aleutian Islands to Mt. Rainier in Washington and the Selkirk Mts. in British Columbia. South and east of these mountain stations its occurrence is doubtful, for although often said to reach Colorado, it is noteworthy that in preparing his *Flora of Colorado* Rydberg was unable to verify its occurrence there.

B. angustisegmentum, on the other hand, is a typical plant of the rich deciduous Appalachian forests, commonly in the shade of beech or sugar maple, occurring from the St. John Valley, New Brunswick, to eastern and southern Ontario, Ohio, Pennsylvania and New Jersey, with its area of greatest development from western Maine to central

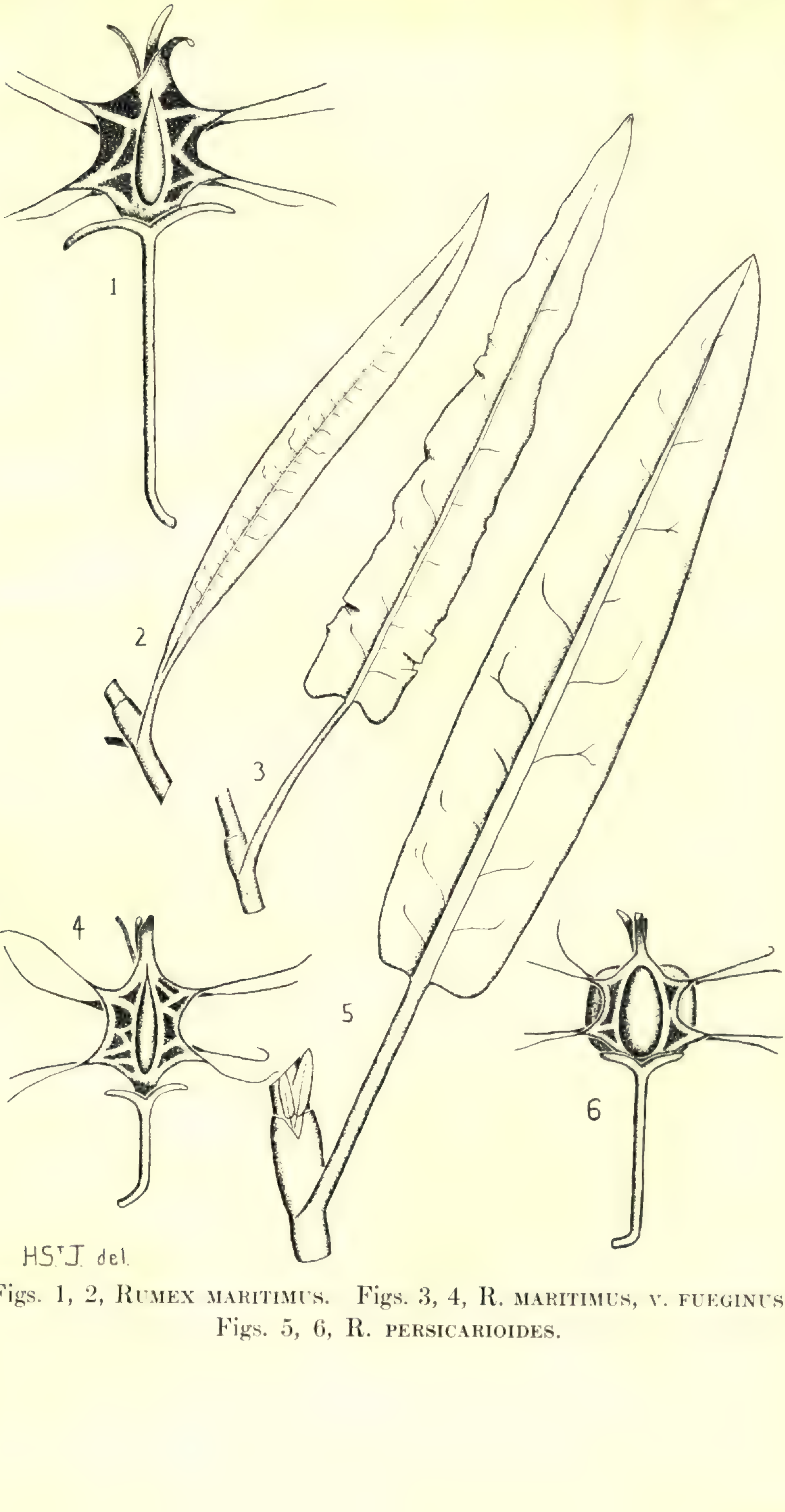
New York. Besides belonging in a quite distinct life-zone from the boreal *B. lanceolatum*, *B. angustisegmentum* differs in essentially all its characters from the northern species. It is a much more slender plant; the sterile frond has more distant narrower and thinner segments; the fertile frond is more open, with the smaller sporangia distant and more immersed in the sides of the branches or adnate to them, while in *B. lanceolatum* the larger sporangia are crowded, often closely approximate, and merely sessile or broadly short-pedicelled; and in *B. angustisegmentum* the spores are smaller, 21–28 μ in diameter, those of *B. lanceolatum* measuring 35–45 μ.—M. L. Fernald, Gray Herbarium.

Altitudinal Limits in Connecticut, a Correction.—In the March Rhodora (p. 66), in pointing out the error of limiting the occurrence of certain species to "elevations in excess of 1,000 feet," I slipped into the opposite error, of stating too low the altitudes of the Connecticut stations cited. In this one paragraph alone in the entire review I had failed to verify the statements, since they were supplied by a Connecticut botanist whose painstaking accuracy is ordinarily above question. But here his trusting to memory and my own failure to verify the statements furnish a pertinent illustration of the necessity of constant verification in scientific work. We have together verified the limits. The Connecticut stations for *Carex castanea* prove to be at about 700 feet altitude; the Willington station for *Ledum* is at about 400 feet, though a recently discovered station in the state is considerably lower; and one of the Salisbury stations for *Petasites* is at about 720 feet altitude. The following corrections should be made on page 66:

line 10; *for* "400" *read*: 700.
for "that the" *read*: that some of the.
line 11; *for* "between 100 and 200" *read*: of about 400.
line 15; *for* "that the" *read*: that one of the.
line 16; *for* "below 600" *read*: of 720.

M. L. Fernald.

Vol. 17, no. 195, including pages 49 to 72 and plate 112, was issued 2 April, 1915.



Figs. 1, 2, Rumex maritimus. Figs. 3, 4, R. maritimus, v. fueginus.
Figs. 5, 6, R. persicarioides.

Rhodora

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SOME ALGAE FROM THE CHINCHA ISLANDS.

Frank S. Collins.

Dr. M. A. Howe has recently published an interesting and thorough paper on the marine algae of Peru [1] based chiefly on collections made from 1906 to 1908 by Dr. Robert E. Coker, while acting as fisheries expert for the Peruvian government. In addition to this collection Dr. Howe has included in his paper all the earlier records for the Peruvian coast, revising these records by inspection and comparison of original specimens. The result is a paper of 185 pages with 66 plates; this coast, in regard to which algological data were few and far between, thus becomes one of the best known regions, outside of the "home regions" of the North Atlantic and the Mediterranean.

In looking over Dr. Howe's book, there was recalled to my mind a small collection of algae from the Chincha Islands, off the Peruvian coast, which I looked over in 1895, but had hardly thought of since. In that year the late Prof. Francis L. Harvey sent me from the Maine State College (now the University of Maine) at Orono, a lot of algae for determination; most of them were from the coast of Maine, and were familiar species, but there was among them this lot of about 15 sheets, referred to as "Chincha Islands specimens" but with no record as to collector or date. More than half were well known species, a few I could name only with a doubt, and as to two I could give no name whatever; this I find on going back to the memoranda made at the time. So much having been recalled to my mind, I wrote to Prof. M. A. Chrysler, now in charge of botany at the University

[1] Marshall Avery Howe, The marine algae of Peru; Mem. Torrey Bot. Club, Vol. XV, p. 1, 1914.

of Maine, and he was kind enough to send me the specimens, which fortunately had been kept by themselves, not distributed in the general herbarium; the two specimens to which I could give no name could not be found, however. On examining the others and comparing them with Dr. Howe's paper, I felt that the safest way would be to submit them to Dr. Howe, which I did, and he very kindly examined them. Before giving the list with the results of his examination, I will state what I have been able to learn of the circumstances under which these plants were collected; I think they will be of interest, especially as they give an incidental view of some former conditions in New England, now quite passed away.

The M. S. C. label on the cover containing the specimens has the record "These algae were collected at the Chincha Is. in 1865 by Mrs. J. H. Nickerson Bangor and donated by her to the college." I think this is in Prof. Harvey's writing. No one now at the College remembers anything about the matter. Some friends of mine in Bangor were obliging enough to make inquiries, and at their suggestion I wrote to Capt. J. H. Nickerson at South Orrington, Maine; I received an interesting reply from J. E. Nickerson of that place, who was not the man in question; he did however once know a Captain John Nickerson of West Bucksport, a "Deep water man" of 40 or 50 years ago. Both the captain and his wife were dead long since, but Mr. Nickerson suggested my writing to Capt. William S. Higgins of Morse & Co., Bangor; Capt. Nickerson's wife was a sister of D. J. Morse of that house, and Capt. Higgins's wife her niece. I found Capt. Higgins extremely kind in trying to get the information I wanted, but at first it seemed hopeless. D. J. Morse was dead, as well as his sister and his brother-in-law; no one could be found who remembered anything about the collections. Finally however, Capt. Higgins was successful to a certain extent, and I learned that Capt. J. K. (not J. H.) Nickerson was at the Chincha Islands in 1862, in command of the bark "Evening Star"; he sailed from the islands to Antwerp and there sold the vessel, returning to New York with Mrs. Nickerson by steamer. After returning he had a ship built for him at Brewer, the "Jennie Hight"; this ship was lost on the Florida coast, on her first voyage.

In those days and for many years before, New England captains and their ships were to be found in all quarters of the world; and often their wives went with them, and this is not the only case where the

woman, when the ship was lying in some foreign port, would mount a little lot of pretty "sea mosses" just as she had done at Pemaquid or Cape Elizabeth, or some other favorite locality at home. We cannot claim it as an exclusively American habit; some readers of RHODORA may recall a note of mine [1] giving account of algae collected by a Norwegian sailor, Axel Moe, including some collected by his sister, Ragnhild Moe, accompanying him on one of his voyages. It is a pleasant idea, not going from home to these places, but taking home with one to them. But it was not all pleasure; incidental remarks in the letters I have received from kind friends who have helped me in looking up this matter show another side. "His second wife was badly injured when he lost the ship D. J. Morse." "My daughter was born, on board ship, at Independencia Bay, about thirty miles south of the Chinchas, 1875." The conditions under which these things happened are now all gone by; Capt. Higgins writes me "I commanded ships twenty years, and have been to the Chincha Islands twice. Since leaving the sea I have been located here in the lumber business, and my past sea life and the old Chinchas seems like a dream."

It is probable that the few specimens now in question are not all that Mrs. Nickerson collected; I have gone into some detail as to my investigations in the hope that some one reading this note may recall some similar collection. The specimens are mounted on good heavy paper, almost cardboard; they are neatly mounted, and are in so good condition that minute epiphytes on them can be examined and determined. The following is the list: —

ULVA sp. Too fragmentary for specific determination.

ENTEROMORPHA PROLIFERA (O. F. Müll.) J. Ag.

ENTEROMORPHA INTESTINALIS (L.) Grev.

ENDODERMA STRANGULANS M. A. Howe, in *Cladophora fascicularis*.

CLADOPHORA HARIOTINA M. A. Howe. Fragmentary.

CLADOPHORA FASCICULARIS (Mont.) Kütz. A rather open form, with long, virgate, but rather flexuous branches.

*CHAETOMORPHA LINUM (O. F. Müll.) Kütz. Fragmentary, but fairly characteristic.

*ECTOCARPUS MITCHELLAE Harv. With plurilocular sporangia (meiosporangia) somewhat smaller than usual. A plant of wide range, common on the shores of the Atlantic from Great Britain to

[1] A sailor's collection of algae, RHODORA, Vol. VI, p. 181, 1904.

the Canaries and from Massachusetts to Florida, and on the coast of California; but this appears to be the first record for South America; this distribution assumes the identity of *E. Mitchellae* Harv. and *E. virescens* Thuret which seems to be now fairly well assured. The history of this species is of some interest; published by Harvey in 1852,[1] on a plant collected at Nantucket by Miss Mitchell, nothing more was known of it for a long time. Farlow [2] says "Only known from the description and plate in the Nereis." The next mention is ten years later [3] when specimens collected by Miss Laura Jernegan at Edgartown were referred to this species, and attention was called to its resemblance to *E. virescens* Thuret. The latter name was used, but as *nomen nudum* only, by Flahault [4] and by Holmes and Batters,[5] but the actual publication was in a paper by Sauvageau.[6] In this paper Sauvageau describes the two forms of plurilocular sporangia found in this species, indicating relationships not before known in the brown algae. In a later paper [7] Sauvageau considers the Edgartown plant to be probably the same species but thinks proof is needed of its identity with *E. Mitchellae* Harv. Börgesen [8] has compared authentic material of both species, finding only such minor differences as are to be expected in a plant as widely distributed as this. *E. Mitchellae*, with meiosporangia, was distributed from Edgartown as No. 321 in Collins, Holden & Setchell, Phycotheca Boreali-Americana, and from Bermuda as No. 1921; with megasporangia from La Jolla, California, as No. 671; megasporangia have also been found at Bermuda.

Chondrus canaliculatus (Ag.) Grev. With cystocarps; quite like the large, little dissected plants collected by Dr. Coker at the same locality.

Gigartina Chamissoi (Ag.) J. Ag.

[1] W. H. Harvey, Nereis Boreali-Americana, part 1, p. 142, Pl. XII. G, 1852.
[2] W. G. Farlow, Marine algae of New England, p. 72, 1881.
[3] F. S. Collins, Notes on New England marine algae, V. Bull. Torrey Bot. Club, Vol. XVIII, p. 335, 1891.
[4] C. Flahault, Herborisations algologiques au Croisic, Bull. Soc. Bot. de France, Vol. XXXV, p. 381, 1888.
[5] E. M. Holmes & E. A. L. Batters, A revised list of the British marine algae. Annals of Botany, Vol. V, p. 79, 1892.
[6] C. Sauvageau, Sur l'Ectocarpus virescens Thuret. Jour. de Bot., Vol. X, p. 98 (p. 37 of reprint) 1896.
[7] C. Sauvageau, Note préliminaire sur les algues marines du golfe de Gascogne, Jour. de Bot., Vol. XI, p. 177 (p. 12 of reprint) 1907.
[8] Börgesen, The marine algae of the Danish West Indies, part 2, Phaeophyceae, p. 129, 1914.

GIGARTINA LESSONII (Bory) J. Ag. These two species are represented each by a well developed typical plant, with cystocarps.

*GRACILARIA CONFERVOIDES (L.) Grev. A long, slender, little branched form; tetrasporic and cystocarpic specimens on the same paper. There appears to be no record in print of the occurrence of this species on the coast of South America, but Dr. Howe reports having received two sterile specimens from Valparaiso, Chile, which he places under this species.

RHODYMENIA CORALLINA (Bory) Grev. In this specimen the frond is flat, even to the point of attachment, very regularly dichotomous and flabellate; there is no trace of the terete stipe occasionally found in this species, always in *R. flabellifolia* (Bory) Mont. The cystocarps, however, are distinctly apiculate, similar to the cystocarps in the plants assigned to *R. flabellifolia* by Howe, while in the plants assigned by him to *R. corallina* the cystocarps were not at all apiculate. It would seem then that cystocarpic characters cannot be depended on for the distinction of the two species.

* PLOCAMIUM COCCINEUM (Huds.) Lyng. forma **compactum** f. nov. ramificatione ad omnes partes densa; axibus principalibus mox indistinctis; pinnulis brevibus, basi contiguis; ramuli fertilis pedicello brevi sporophylla brevia, numerosa, dense fasciculata, ferente.

Branching dense throughout; main axes soon indistinct; pinnules short, contiguous at base; fertile branchlets with short pedicel and densely packed, short sporophylls. Chincha Islands, Peru, Mrs. J. K. Nickerson. Type in herb. University of Maine, Orono, Maine.

If compared with the slender form of *P. coccineum* common in Europe, the present plant would seem amply distinct, specifically, but there is a great variety in habit even in European plants, as will be seen by comparing the figures by Turner,[1] Greville,[2] and Harvey.[3] The first two represent the slender form, the last the broader form; the Californian plant resembles the latter, and like some other species common to Europe and California, is a larger and somewhat ranker plant than the European. Forma *compactum* agrees with the Californian plant in the breadth of the branches of the various orders, but the branches divide more frequently, the branch being often of the same size as the axis, and giving a subdichotomous appearance. In

[1] Dawson Turner, Fuci, Vol. I, p. 130, Pl. LIX, 1808.
[2] R. K. Greville, Algae Britannicae, p. 98, Pl. XII, 1830.
[3] W. H. Harvey, Phycologia Britannica, Pl. CLXXV, 1846–51.

the Californian plant there are usually a few long virgate axes; in forma *compactum* the main axes are soon lost among the frequent forkings. The tetraspores are as usual borne in transformed ramuli, but instead of a few, often only two or three, lanceolate sporophylls, we have a dense cluster, the sporophylls often overlapping, occasionally so numerous that the original formation in one plane is hardly distinguishable. The color is a dark, dull purplish red.

P. coccineum has a wide but peculiar distribution. In Europe it ranges from the Faroe Islands to the Canaries and throughout the Mediterranean; in America it is known to occur from Vancouver to the Mexican boundary, at the Galapagos Islands, and on the coast of Chile. I can find no certain record of its occurrence on the American shore of the Atlantic. Harvey,[1] after the record of the California locality, adds "Boston Bay, Miss Hawkshurst." Bailey[2] gives "Mass., Rev. J. L. Russell." Hooper,[3] has "Lynn, Massachusetts." I have a specimen marked "Plocamium coccineum Salem and Cohasset, Mass., J. L. Russell." The specimen is a small scrap of *Ceramium rubrum* (Huds.) Ag.; it is a peculiar form, with many short, often curved ramuli, set in secund series of three or four, really resembling some of the more slender forms of *P. coccineum*. A glance with a pocket lens, however, shows at once the articulate structure. Harvey continually refers in the Nereis to the Hooper and Bailey collections, and when, as in the case of the species now in question, and also the "*Delesseria Hypoglossum*, Boston," "*Rhodymenia Palmetta*, Newburyport" and others of Hooper's list, Harvey makes no mention, we may safely conclude that he considered the determination wrong, or the record otherwise unreliable. Before the publication of the Nereis there was no text book for this country, and American collectors perforce made use of English manuals. As noted by Farlow[4] it is not uncommon to find *Euthora cristata* labelled *Plocamium* in the older collections; moreover I have seen in such collections specimens of European species marked with American localities, when character of paper and handwriting of name agreed with other European specimens in the same collection, the record of locality being in a different writing from that of the name. There is no occasion to

[1] W. H. Harvey, Ner. Bor.-Am., part 2, p. 153, 1853.
[2] J. T. Bailey, Notes on the algae of the United States, Am. Jour. Sci., Ser. 2, Vol. III, p. 84, 1847.
[3] John Hooper, Introduction to Algology, p. 24, Brooklyn, 1850.
[4] Marine Algae of N. E., p. 151, 1881.

suppose that there was any intentional deception, but allowance must always be made for the possibility of mistakes of this kind in older collections of amateurs, who have received specimens from foreign correspondents. I think we can safely ignore the "Boston Bay" reference, and consider that the species is not known on the western side of the Atlantic.

As regards the west coast of the Pacific, De Toni[1] records *P. coccineum* "Hab. ad Enoshima (K. Okamura n. 18)," but later[2] under *P. coccineum* makes no mention of Japanese localities and no reference to the earlier paper under this species. Okamura[3] figures *P. leptophyllum* Kütz. var. *flexuosum* J. Ag. with reference to De Toni, Syll. Alg., Vol. IV, p. 589, and synonym *P. coccineum* var. *flexuosum* Harvey. It seems safe to conclude that *P. coccineum* is limited to the east shore of each ocean. As to the suggestion of De Toni, l. c., p. 591, that the Californian plant should be placed under *P. leptophyllum* Kütz., it is negatived by the fact that the plants distributed as P. B.-A., No. 994. b, representing the broad form common on the California coast, have branched sporophylls, in the form characteristic of *P. coccineum*, not the simpler form of *P. leptophyllum*.

NITOPHYLLUM CRYPTONEURON (Mont.) De Toni. A small frond, attached to *Polysiphonia*.

* POLYSIPHONIA sp.? A rather coarse form with short segments and four pericentral cells. In habit it somewhat suggests *Strebloclada camptoclada* (Mont.) Falk., but is evidently monopodial. I do not recognize it by the habit, and it adheres so closely to the paper that microscopic examination is difficult.

PTEROSIPHONIA DENDROIDEA (Mont.) Falk. A well developed plant, about 10 cm. high, which is rather large for this species; not in fruit.

STREBLOCLADIA SPICATA M. A. Howe. "Primary branches longer and better developed than in the type." Note by Dr. Howe.

PLEONOSPORIUM VENUSTISSIMUM (Mont.) De Toni. With polyspores.

CERAMIUM RUBRUM (Huds.) Ag. A small plant, about 3 cm. high, with tetraspores. Cortication uniform, segments short, apices strongly forcipate, but not involute.

[1] G. B. De Toni, Phyceae Japonicae novae, Mem. Roy. Ist. Venet., Vol. XXV, No. 5, p. 29, 1895.

[2] Id., Sylloge Algarum, Vol. IV, Sect. II, p. 577, 1900.

[3] K. Okamura, Icones of Japanese algae, Vol. III, p. 14, Pl. CIII, figs. 6–7, 1913.

Ceramium clavulatum Ag. A well developed, not much branched form.[1]

The five species starred above are additions to Dr. Howe's list for Peru. I much regret not being able to learn any more about the collector, nor as to whether any other specimens of her collecting are in existence. The character of these specimens is far above the standard of the ordinary "moss collector." There are two species of *Gigartina*, each represented by a single specimen in full cystocarpic fruit; a single specimen of *Gracilaria*, with both cystocarpic and tetrasporic plants; two specimens of the *Plocamium*, one cystocarpic, the other tetrasporic. Very few collectings average as well as does this, for the scientific usefulness of the specimens.

In conclusion, my thanks are due to Prof. Chrysler for the opportunity to re-examine the specimens; to Dr. Howe for his examination of them and his notes; and to all who have helped me in the search for information as to the collector.

North Eastham, Massachusetts.

TWO VARIATIONS OF SILENE ANTIRRHINA.

M. L. Fernald.

Silene antirrhina L., forma **Deaneana**, n. f., internodiis non glutinosis.— Occasional throughout the range of the species. Type: recently cleared land near Winter Pond, Winchester, Massachusetts, June 22, 1913, *Fernald & Long*, no. 9494 (herb. New England Botanical Club).

This form, discussed in some detail by Mr. Walter Deane in Rhodora, xii. 129–131 (1910), is so constant in the colonies where it occurs that it merits some designation; but differing from the typical form of the species only in the absence of the glutinous band found on some of the upper internodes in true *S. antirrhina* and apparently not hav-

[1] In this connection I would note that an authentic specimen of *Ceramium miniatum* Suhr in my possession shows that the Peruvian plant mentioned by Howe, p. 157, is different; Dr. Howe agrees with me as to this, and expects to take up the matter later.

ing a distinct range, the plant is best treated as a form rather than a variety.

In the recognized varieties of *S. antirrhina*,— the typical plant, var. *vaccarifolia* Rydberg, var. *depauperata* Rydberg, var. *laevigata* Engelm. & Gray, and var. *divaricata* Robinson, the capsule and close fruiting calyx are ovoid-campanulate in form and the cauline leaves (except in the short-fruited var. *depauperata*) are lanceolate or oblanceolate. In the arid region of New Mexico and Chihuahua, however, the characteristic development of the species is a plant with linear cauline leaves, subcylindric capsules and fruiting calyces, the latter more strongly nerved than in many forms of the species. This plant merits distinction as

S. ANTIRRHINA, var. **confinis**, n. var., foliis crassis, caulinis linearibus; calycibus fructiferis anguste subcylindricis valde costatis, capsulis subcylindricis 6–8 mm. longis 3.5–4 mm. diametro.— NEW MEXICO: Cobre, August, 1851, *Thurber*, no. 1123; White Mts., alt. 7000 ft., August 5, 1897, *Wooton*, no. 286 (transitional). CHIHUAHUA: near St. Diego, alt. 6000 ft., May 15, 1891, *Hartman*, no. 684 (TYPE in Gray Herb.).

GRAY HERBARIUM.

MIBORA MINIMA (L.) DESV. AT PLYMOUTH, MASSACHUSETTS.— Among some specimens sent to the Gray Herbarium for determination by Mr. Benj. M. Watson of Plymouth, Massachusetts, were two tufts of a small grass, which Mr. Watson in his letter of April 12th states were growing wild in his nursery and had been in bloom for several weeks. They proved to be *Mibora minima* (L). Desv. a genus and species not previously reported from North America, to the best of my knowledge. It is a native of Europe — Great Britain south to northern Italy and Greece and also of northern Africa. Its generic position in the Manual would be directly after *Alopecurus*.

MIBORA Adans. Fam **2**: 495 (1763).

MIBORA MINIMA (L.) Desv. Obs. Pl. Ang. 45 (1818): Desv. Fl. Anj. 46 (1827). *M. verna* Beauv. Agrost. 30, 148, 167; Atlas 7, t. 8, f. 4 (1812). A small tufted annual 3 to 8 cm. high with short, narrow leaves clustered at the base; the sheaths very thin. Spikelets small, purplish, almost sessile, in a simple, slender spike about 10 to 15 mm. long.— F. TRACY HUBBARD, Cambridge, Massachusetts.

ELYMUS ARENARIUS AND ITS AMERICAN REPRESENTATIVES.

Harold St. John.

Elymus arenarius L. of the sea beaches and sand dunes of the European coasts was known to the early botanists and was treated by Linnaeus in his Species Plantarum.[1] As this species is well marked among its European relatives it has had a simple and uneventful history in botanical literature of the old world. The only question causing any serious difference of opinion is whether *Elymus sabulosus* Bieb. should be treated as a variety of *E. arenarius* or as a distinct species. Differing from the latter by its more vigorous growth, by its larger number of spikelets at a node, by its stiff awl-shaped glabrous glumes, by its lemmas glabrous from the middle to the tip, by its shorter anthers (4.5–5 mm. long), and by its smaller grain (6 mm. long, 1.5 mm. broad), this plant of southern Russia and Siberia with a range scarcely touching that of *E. arenarius*, seems to the writer to be specifically distinct. An earlier name, however, must displace *E. sabulosus* Bieb. Without a known locality, but fourteen years earlier, *Elymus giganteus* Vahl.[2] was described in terms quite applicable to the plant which has so long passed as *E. sabulosus*. In some of the larger herbaria are specimens of a plant grown in cultivation under the name *Elymus mexicanus* Cav.[3] which is indistinguishable from *E. giganteus* Vahl. The great amount of botanical collecting done in Mexico since Cavanilles described his *E. mexicanus* has not established this as one of the native species and its perfect agreement with *E. giganteus* of southern Europe and Asia indicates that Roemer and Schultes[4] were correct in reducing *E. mexicanus* to a synonym of *E. giganteus* Vahl.

In North America the group of coastal species with awnless broad glumes and awnless lemmas, in which *E. arenarius* is included, has had a much more eventful bibliographical history. Kalm detected the

[1] L. Sp. Pl. i. 83 (1753).
[2] Vahl, Sym. Bot. iii. 10 (1794).
[3] Cav. Descr. Pl. 314 (1802).
[4] Roem. & Schult. Syst. Veg. ii. 774 (1817).

presence of "*Elymus arenarius*" on the north shore of the St. Lawrence [1] but the later generation of botanists, Michaux, Bigelow, and Pursh did not know of the presence of the common northern plant in a narrow strip along the coast of the regions about which they wrote.

From specimens found in Kamchatka and the Aleutian Islands *Elymus mollis* Trin.[2] was described, having the culm velvety-pubescent at summit, spikelets about 7-flowered, glumes softly hirsute and 3–5-nerved. *E. arenarius* of Europe has, on the contrary, the culm glabrous or with a mere trace of fine puberulence at the summit; spikelets 2–4-flowered, very stiff and rigid; glumes sparingly hispid or smooth and shining, with a definite midrib and with or without a pair of inconspicuous secondary ribs.

After an interval of nine years Presl proposed the new name *Elymus dives* [3] for a plant found on Nootka Sound, Vancouver Island. His description leaves no doubt but that he was dealing with the plant having culms velvety-pubescent at summit, the glumes many-nerved and softly hirsute, which Trinius had already named *E. mollis*.

In the same year, 1830, this plant, when found on the eastern coast of North America in Labrador, was published by Meyer as var. *villosus* of *E. arenarius*.[4] He gives with this new name a few comments upon the appearance of the new variety which differs from the European *E. arenarius* by having villous longer spikelets. This hint as to the characters and the identity with *E. mollis* of all recent collections from Labrador referred to *E. arenarius*, var. *villosus* convinces the writer that *E. arenarius* L., var. *villosus* E. Mey. and *E. mollis* Trin. are one and the same.

From another eastern station, Isle-Verte, Temiscouata Co., Quebec, a species of the same affinity, *E. ampliculmis* Provancher [5] was given a full and definite description. The points, "Chaume pubescent au sommet 5–8 flores" show clearly enough that this plant belongs with *E. arenarius*, var. *villosus*. In fact, *E. mollis* is cited as a synonym under the new species *E. ampliculmis*, but the principle of priority does not allow such a change as this to be followed.

For many years this group of American plants called *Elymus mollis* was thought to be sufficiently understood, but in 1898, *E. capitatus*

[1] Kalm, Reise nach nordlichen Amerika iii. 515 (1764).
[2] Trinius in Spreng. Neue Entdeck. ii. 72 (1821).
[3] Presl, Rel. Haenk. i. 265 (1830).
[4] E. Meyer, Pl. Labrador. 20 (1830).
[5] Provancher, Fl. Canad. ii. 706 (1862).

Scribner [1] from Homer, Alaska, was set off, differing in having short thick spikes, 3–4 cm. in diameter, and longer floral parts. On dissecting, it can be seen that the grain is longer and lanceolate in outline, instead of oblong as are the shorter grains of *E. mollis* and *E. arenarius*. Dissection of the grain of *E. capitatus* shows within, instead of hard compact stored food material, a mass of spongy white tissue only partially filling the space. Specimens such as Piper's no. 4664 from Kenai, Alaska, Aug. 18–20, 1904, bearing from one rootstock two flowering culms, one of which is undeniably *E. mollis* Trin., and the other as surely *E. capitatus* Scribn., indicate clearly enough that *E. capitatus* Scribn. is a pathological state of *E. mollis* Trin. In a later article [2] published with Merrill, Scribner himself included *E. capitatus* under *E. mollis* Trin.

From northwestern North America *E. villosissimus* Scribner [3] of this same group was described, but this plant is so very like *E. arenarius*, var. ***villosus*** that it is not easy to discuss its differences. Scribner and Merrill [4] in their "Grasses of Alaska" fail to add any new characters, although they maintain *E. villosissimus* as a species. Their key difference is

Spike less than 8 cm. in length.....*E. villosissimus.*
Spike exceeding 10 cm. in length.....*E. mollis.*

In the description following, which is a condensed form of the original one, *E. villosissimus* is allowed to have spikes from 5 to 8 cm. in length. According to this arrangement what is to be done with plants which have spikes less than 5 cm. in length, or more than 8 and less than 10 cm. in length? Such plants are no less common than those which fall between the artificial limits set to define *E. villosissimus*. The plant called *E. mollis* has been found in the far north with spikes as short as 4 cm. and near its southern limit with spikes as long as 35 cm. Any large collection will show from intermediate regions a complete series of specimens with no appreciable break in the length of spikes. From this it is plain to the author that *E. villosissimus* Scribn. must be treated as a synonym of *E. arenarius*, var. *villosus*.

The older herbarium-sheets of *E. arenarius*, var. *villosus* show an interesting tide of opinion, almost all giving evidence of numerous

[1] Scribner, Bull. U. S. Div. Agrost. xi. 55, pl. xiv (1898).
[2] Scribner & Merrill, Contrib. U. S. Nat. Herb. xiii. Pt. 3, 90 (1910).
[3] Scribner, Bull. U. S. Div. Agrost. xvii. 326, fig. 622 (1899).
[4] Scribner & Merrill, l. c., 89 (1910).

alterations of the name by different workers from *E. mollis* to *E. arenarius* and back again. An examination of the various North American Floras discloses a similar vacillating policy in the treatment of *E. arenarius* and *E. mollis*. Many contain such comments as "Cette Espèce est très voisine de l'Espèce Arenarius d'Europe" (Provancher), or "Near E. arenarius" (Gray), or "the confusion that seems to exist between this species and E. mollis" (Macoun).

Specimens of *E. arenarius*, var. *villosus* from the southern part of the range, the coast of New England or California, are superficially enough like *E. arenarius* of Europe to be confusing. They have the glumes sometimes nearly glabrous and scarcely soft in texture. On the other hand, specimens from the far north are strikingly different from *E. arenarius* because of the extremely soft texture of the glumes and their heavy coat of long villous pubescence, but because of the perfect series of transitions these two tendencies seem to be due to climatic factors and to be negligible from the point of view of classification. This whole series of plants representing *E. arenarius*, var. *villosus* has, however, the positive distinguishing characters of culm velvety-pubescent at summit, and glumes pliant, pubescent, and prominently 3–5-nerved. The great mass of material of the European *E. arenarius* has the glumes stiff, hard, with a prominent mid-nerve, with or without less developed lateral nerves, and with the summit of the culm glabrous. If this were an absolute rule the American plant called var. *villosus* by Meyer would seem to be a distinct species, but occasional specimens of *E. arenarius* from Europe show a trace of puberulence at the summit of the culm. On the other hand, occasional specimens of the plant from the northern American or Asiatic coasts, although conspicuously pubescent at the summit of the culm, have the lateral nerves of the glumes less developed than in more typical specimens. Because of these transitions and the identity of the anthers and grains it seems best to treat the American and Asiatic plant, with the culm velvety pubescent at summit and the glumes 3–5-nerved, as *Elymus arenarius* L., var. *villosus* E. Meyer.

The geographic distribution of *E. arenarius*, var. *villosus* is very extensive as it grows on the beaches and brackish shores from Alaska south along the coast to Santa Cruz, California, on the Arctic Archipelago, the shores of Hudson Bay, and of Lake Superior, and from Labrador south along the coast to Cape Cod, Massachusetts, on Greenland, and from Bering Straits south to Japan. This statement of

range is made up from actual specimens observed. The inclusion of localities based on published records, which in many cases give either no description at all or one so scanty that it is impossible to tell whether the var. *villosus* or *E. arenarius* is the subject, would merely continue the confusion which has so long existed between these two plants.

From three localities on Puget Sound are collections of a plant which is allied to *E. arenarius*, var. *villosus* because of the pubescent summit of the culm and the nerves of the glumes, but the spikelets are longer, stiffer, often 5–8-flowered, and borne on definite pedicels which are often prolonged and branched, bearing several spikelets. *Elymus arenarius*, f. *compositus* Abromeit, although I have seen no specimens, seems to be a perfect match for this well marked plant from the State of Washington, because of the points clearly mentioned in the original description. "Die Ähren entwickeln im unteren und mittleren Teile statt der 3–4 blütigen Ährchen gegen 4 cm. lange und etwa 8 blütige Seitenäste. Beobachtet: Bei Kome [Greenland] unter normalen Exemplaren der Form *β villosus*." This unusual plant may be known as

ELYMUS ARENARIUS L., var. **compositus** (Abromeit), n. comb. *E. arenarius* L., f. *compositus* Abromeit, Bibliot. Bot. viii. heft 42, 96 (1899). The following North American stations are known: WASHINGTON: on sandy ground, shore of Bellingham Bay, July 17, 1890, *W. N. Suksdorf*, no. 1028; on high sea beaches, Fairhaven, July 2, 1897, *C. V. Piper*, no. 2606; Everett, July 7, 1904, *C. V. Piper*, no. 4909.

A noteworthy plant of this group of awnless, broad-glumed, maritime species has been collected along the sea coast at Westport, California. Like *E. arenarius* of Europe it has the summit of the culm perfectly glabrous; and like the var. *villosus* of the American continent it has the glumes prominently ribbed, but it differs from both in having the lemmas glabrous at base, pulverulent above, in having a smaller grain (5 mm. long), and a smaller anther (1.5 mm. long). Because of its marked differences from these near relatives it is proposed as

ELYMUS **strigatus**, n. sp., caespitosus perennis 2.5–4 dm. altus, culmo paullum striato glabro, vaginis laxis profunde striatis, strigis cellulari-reticulatis, ligulis brevissimis (1 mm. longis), laminis linearibus (4–14 cm. longis, 2–6 mm. latis) gabris profunde striatis, spica 6–11 cm. longa, 6–10 mm. lata, spiculis appressis vel geminis vel solitariis ad basim spicae 1–3-floris, flosculo supremo sterili, glumis lanceolatis (10–15 mm. longis, 1.5–4 mm. latis) cum nervis 4–7 promi-

nentibus, lemmis ad basim glabris supra pulverulentis, exteriori 9 mm. longo acuto, interiori 8 mm. longo obtuso, antheris 1.5 mm. longis, palea semen oblongum (5 mm. longum, 1 mm. latum) arcte amplectenti.

Tufted perennial, 2.5–4 dm. high: the culm slightly striate and quite smooth: leaf-sheaths loose, deeply striate, cellular-reticulate in the channels; ligule scarious and very short (1 mm. long); leaf-blades linear (4–14 cm. long, 2–6 mm. broad) smooth, deeply striate: spike 6–11 cm. long, 6–10 mm. thick: spikelets appressed, paired, or often single at the base of the spike, 1–3-flowered; the upper flower sterile: glumes lanceolate, 10–15 mm. long, 1.5–4 mm. broad, with 4–7 prominent raised strigose nerves: lemmas glabrous at base, pulverulent above; the outer 9 mm. long, pointed; the inner 8 mm. long, blunt: anthers 1.5 mm. long: palea closely investing the grain: grain oblong, 5 mm. long, 1 mm. broad. CALIFORNIA: sea cliffs, Champion gulch, below Westport, Mendocino Co., August 1, 1902, *J. W. Congdon* (TYPE in U. S. Nat. Herb.); sea cliffs below Westport, August 1, 1902, *J. W. Congdon*.

Key to the Species and Varieties Discussed.

A. Grain 6–10 mm. long: anther 4.5–6.5 mm. long: leaf blades scabrous above,
  B. Spikelets normally more than two at a node: glumes awl-shaped: lemmas pubescent up to the middle.....*E. giganteus* Vahl.
  B. Spikelets normally paired: glumes lanceolate or linear-lanceolate: lemmas pubescent to the tip,
    C. Summit of culm glabrous: glumes stiff and hard, 1- rarely 3-nerved, often glabrous and shining.....*E. arenarius* L.
    C. Summit of culm velvety-pubescent: glumes 3–5-nerved,
      Spikelets sessile: glumes pliant, softly villous, or rarely glabrate
        E. arenarius L., var. *villosus* E. Mey.
      Spikelets pedicelled: glumes stiff, hispid or glabrate
        E. arenarius L., var. *compositus* (Abro.) St. John.

A. Grain 5 mm. long: anther 1.5 mm. long: leaf blades smooth: summit of culm glabrous: glumes scabrous, prominently 4–7-ridged: lemmas glabrous at base, pulverulent above.....***E strigatus* St. John.**

HARVARD UNIVERSITY.

A HANDY BOOK ON TREES AND SHRUBS.— The ever increasing books intended to simplify the determination of the common plants has received a notable addition in another of Mr. Mathews's volumes. The *Field Book of American Trees and Shrubs* [1] is more ambitious in

[1] FIELD BOOK OF AMERICAN TREES AND SHRUBS. By F. Schuyler Mathews. pp. 465 + xvi, freely illustrated. Cloth $2.00; full leather, $2.50; postage 15 cents. G. P. Putnam's Sons, New York.

scope than its predecessors, attempting to give a description of all the more common trees and shrubs of the United States, with outline sketches of the foliage and, when needed, flowers or fruit; and characteristic illustrations of the bark and habit of many of the trees. If it were desirable to judge the books of this class by exact scientific standards, it might be suggested that the subtitle, "A concise Description of the Character and Color of Species common throughout the United States," is misleading, since none of the species discussed is "common throughout the United States." But accepting the book in the friendly and untechnical spirit in which it is written and pardoning the omission of many species common in sections of the country presumably unfamiliar to the author, we may say that the book will meet a real demand. The text and the maps illustrating the distribution of some of the species have been compiled from authoritative sources, and the sketches have the life-like qualities so characteristic of Mr. Mathews's drawings. Altogether the book is one which will give satisfaction not only to the beginner but to all who wish a ready reference volume on our more common trees and shrubs.— M. L. F.

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MICHAUX'S PANICUM MURICATUM.

M. L. Fernald.

For some years it has been well known to New England botanists that, besides the common introduced *Echinochloa Crusgalli* (L.) Beauv. and the essentially maritime *E. Walteri* (Pursh) Nash, we have a third species indigenous in sloughs, ditches, dune-hollows, pond-margins, etc., with the glabrous sheaths and comparatively short awns of the Old World *E. Crusgalli* but with the trichomes of the second glume and the sterile lemma quite unlike those of the introduced species. In European *E. Crusgalli* the margins and often the nerves of the second glume and the sterile lemma bear appressed-ascending fine trichomes which are not thickened at base or only slightly and inconspicuously so. In the indigenous American plant, however, these trichomes in the mature spikelets are stiffer and coarser, strongly divergent, and have a conspicuous papillose or pustular base, giving to the spikelets and consequently to the inflorescence a very muricate appearance. This indigenous plant of eastern America, found in the coastal region from southern Maine to Georgia and Mississippi and inland at low altitudes to the Great Lake region, South Dakota and Kansas, well matches Michaux's description of his *Panicum muricatum* from "Canada ad ripas lacus *Champlain* et ad lacum *Ontario*"; "glumis.... muricato-hispidissimis. *Obs.* affine C. *Galli:* flores habitu Cenchri"; [1] and is clearly indicated by the present writer's notes, made in 1903, after examination of the Michaux type. The indigenous American plant is also further indicated by Poiret's full description of Michaux's Lake Champlain

[1] Michx. Fl. Bor.-Am. i. 47 (1803).

material as *P. pungens* (*P. muricatum* Michx., not Lam. [i. e. Retz.]), when he said: "Cette plante a l'aspect d'un *cenchrus* par ses fleurs; elle se rapproche, par ses autres caractères, du *panicum crus galli*." [1] But in view of Hitchcock's identification of the Michaux type from Lake Champlain with the European *E. Crusgalli*,[2] it has seemed desirable to have the specimen again examined. M. Gagnepain has, therefore, most kindly compared for me specimens sent as nos. 1 and 2: no. 1, the indigenous plant which seemed to be Michaux's species; no. 2, the introduced *E. Crusgalli*. Of the former specimen he writes, under date of June 26, 1914.

"1. De tous points comparable au *Panicum muricatum* de l'herb. Michaux:

Mêmes pointes sur les glumelles, fortes, raides avec un renflement dur à la base. Ce sont ces aspérités qui ont sans doute fait donner à l'espèce son nom.

* * * * * * * * * * * *

J'ai écrit autrefois sous la dictée de M. Hitchcock, je crois, pour le *P. muricatum* Michx., P. CRUS GALLI L."

As stated, the European *E. Crusgalli*, of which the writer has examined many specimens, has much finer less spreading trichomes on the spikelets and is well matched by the commonly introduced plant of barnyards, cultivated fields, and similar artificial habitats. In North America rare plants seem to indicate a slight transition between the introduced and the indigenous plants but these specimens are so infrequent as to seem like probable hybrids of the two species. In view of the constancy of the European plant in the Old World, where it does not come in contact with the American plant with strongly muricate spikelets, this seems the reasonable explanation, and the indigenous American plant may be called

ECHINOCHLOA **muricata** (Michx.) n. comb. *Panicum muricatum* Michx. Fl. Bor.-Am. i. 47 (1803). *P. pungens* Poir. Encycl. Suppl. iv. 273 (1816). *P. Crusgalli*, var. *muricatum* Farwell, Mich. Acad. Sci. Rep. vi. 210 (1904).— The following are characteristic specimens. QUEBEC: shores of Lake Champlain, *Michaux* (type in herb. Michaux). MAINE: Harding's, Brunswick, September, 1899, *K. Furbish;* wet clayey basin, North Berwick, August 27, 1894, *J. C. Parlin.* VERMONT: Manchester, August 22, 1903, *Blanchard*, no. 22. MASSACHUSETTS: sandy head of a cove, Bay View, Gloucester, September 11,

[1] Poir. Encyc. Suppl. iv. 273 (1816).
[2] Hitchc. Contrib. U. S. Nat. Herb. xii. 146. (1908).

1913, *Fernald, Hunnewell & Long*, no. 8672; exsiccated pond-holes, Lakeville, August 26, 1913, *Fernald & Long*, no. 8668; Brewster, September 11, 1912, *F. S. Collins*, no. 1555; sandy river-shore, Stockbridge, August 24, 1902, *Hoffmann*. RHODE ISLAND: peaty margin of small pond north of Crescent Beach, Block Island, August 20, 1913, *Fernald & Long*, no. 2667. CONNECTICUT: Hart's Upper Reservoir, Berlin, September 27, 1900, *J. N. Bishop;* field, Bridgeport, August 19, 1893, *E. H. Eames*. NEW YORK: Castle swamp, Oneida, August 12, 1906, *House*, no. 2776. NEW JERSEY: Atlantic City, August, 1895, *Scribner*. WEST VIRGINIA: Sweet Springs, September 5, 1903, *Steele*, no. 201; Dry Fork River, near Harmon, September 12, 1904, *Greenman*, no. 52. NORTH CAROLINA: cultivated ground, Biltmore, July 23, 1897, *Biltmore Herb.* no. 809*a*. GEORGIA: wet meadows, Lafayette, August 2, 1900, *Harper*, no. 343. MISSISSIPPI: near Starkville, September 27, 1896, *Kearney*, no. 7. ONTARIO: Galt, September 1, 1908, *Heriot*. MICHIGAN: Alma, August 28, 1895, *C. A. Davis;* Owasso, August 24, 1890, *G. H. Hicks* (material compared by M. Gagnepain and pronounced identical with the Michaux plant). WISCONSIN: wet grounds, "Native!" Milwaukee, *Lapham*. ILLINOIS: gravelly beach, Sangamon R., White Heath, October 5, 1912, *A. S. Pease*, no. 14,090; swamp along lake shore, Waukegan, August 17, 1906, *Gleason & Shobe*, no. 320. MINNESOTA: Ft. Snelling, August 22, 1891, *E. A. Mearns*, no. 39. MISSOURI: fields, Whiteside, September 11, 1911, *J. Davis*, no. 1017. KANSAS: open ground, Riley Co., 1896, *J. B. Norton*, no. 884b. SOUTH DAKOTA: Huron, *D. Griffiths*, no. 773.

GRAY HERBARIUM.

NOTES ON NEW ENGLAND HEPATICAE,— XII.

ALEXANDER W. EVANS.

IN the present series of Notes the following additions to the hepatic flora of New England are reported and discussed: *Fossombronia cristula*, *Lophocolea alata*, *Cephalozia macrostachya*, and *Cephaloziella spinicaulis*. Two other species, *Cephalozia catenulata* and *Calypogeia paludosa*, are included for nomenclatorial reasons, and the paper is concluded by a list of additions to local state floras and a census of New England Hepaticae according to our present information.

1. FOSSOMBRONIA CRISTULA Aust. Proc. Acad. Philadelphia for

1869: 228. On moist sandy or clayey soil. Massachusetts: Amesbury (*J. W. Huntington*, October, 1901); Middleton, Essex County (*H. H. Bartlett*, November, 1908); Reading (*C. C. Kingman*, November, 1908). Connecticut: Milford (*A. W. E.*, October, 1909). New to New England. The following stations outside of New England may likewise be recorded: Axton, New York (*E. B. Chamberlain*, September, 1910); near Batsto, New Jersey, the type locality (*C. F. Austin*, October, 1868, distributed in Hep. Bor.-Amer. *121*); Highlands, New Jersey (*C. C. Haynes*, October, 1905, and November, 1912, the latter specimens distributed in Amer. Hepat. *118*, as *F. foveolata*); Morgantown, West Virginia (*J. L. Sheldon*, October, 1909); between Dune Park and Mineral Springs, Indiana (*G. S. Bryan*, 1914).

The elaters of this curious species, as originally emphasized by Austin, yield its most distinctive characters. They are exceedingly inconspicuous; when the contents of a capsule are examined under a low magnification it often appears as if no elaters were present, and a magnification of at least three hundred diameters is essential for their proper study. They are remarkable not only on account of their small size and delicate structure but also on account of their variability in form and scanty development. Their most unusual features, however, are found in the local thickenings of their walls. Instead of forming two or more parallel spirals, these usually consist of from five to nine rings, some of which may be connected to form a single rudimentary spiral. In rarer cases a longitudinal band of thickening is present to which one or more rings are attached. According to a series of measurements made on a part of the type material the elaters vary from 28 μ to 58 μ in length and from 6 μ to 18 μ in width. But the length and width do not vary proportionally, one elater having a width of 18 μ being only 36 μ in length. The bands of thickening are less deeply pigmented than in most species of *Fossombronia* and are sometimes very pale indeed and difficult to demonstrate. According to Stephani [1] the elaters are acuminate, but all those studied by the writer were blunt. The variability in form is indicated to a certain extent by the measurements given: it should be added that most of the elaters are straight or nearly so and that some of them show irregular branching.

The brown spores in the type material are mostly between 36 μ

[1] Mém. de l'Herb. Boissier **16** : 31. 1900.

and 40 μ in diameter, while those in the material from Middleton, Massachusetts, are mostly between 40 μ and 46 μ. The spherical face is covered over with a more or less regular reticulum formed by intersecting lamellae about 2 μ in height. These lamellae appear pale brownish when seen from the surface, dark brown when seen in profile. No border is developed at the periphery of the spherical face, but the neighboring ridges of the reticulum sometimes give the effect of a narrow interrupted border. The meshes of the reticulum are mostly 8–10 μ wide and the spherical face usually measures six or seven meshes across. Sometimes the reticulum is irregular or incomplete. The three plane faces are not clearly defined, the bounding edges being rounded and destitute of distinct longitudinal thickenings. This portion of the spore-surface is roughened by low and irregular warts and low ridges which never unite to form a reticulum.

A new South American *Fossombronia* with elaters similar to those of *F. cristula* was described by Goebel [1] three years ago under the name *F. Luetzelburgiana*. It was based on material collected in 1911 by Ph. von Luetzelburg in the Serra dos Orgaos, near Rio de Janeiro, Brazil. According to its author the elaters measure 40–65 μ in length and are characterized by annular thickenings with very rare indications of spiral thickenings. The spores measure 50 μ in length and are covered over with a lamellate reticulum. It will be seen at once that this species is very close indeed to *F. cristula*. In fact the only essential difference brought out is the dioicous inflorescence, that of *F. cristula* being monoicous (paroicous). Goebel regards the elaters of *F. Luetzelburgiana* as reduced structures and compares them with the sterile cells in the capsules of *Sphaerocarpos*, *Riella*, and *Corsinia*, in which no thickenings whatever are produced.

Among northern species the closest ally of *F. cristula* is *F. foveolata* Lindb. The spores, in fact, are exactly alike in the two species, so far as their surface-sculpture is concerned. According to authors there is a slight difference in the size of the spores. Underwood [2] states that those of *F. cristula* are 35–44 μ in diameter while those of *F. foveolata* are 42–50 μ. Stephani gives measurements of 37 μ and 40 μ, respectively. These differences are not constant and, even if they were, they would be too slight to deserve much emphasis. With the difference in the spore measurements eliminated there is nothing

[1] Flora **105** : 55. *f. 1A, 1B, 2–4.* 1912.
[2] Bot. Gaz. **21** : 70. 1896.

to separate *F. cristula* from *F. foveolata* except the peculiar elaters. In *F. foveolata* these are of the type normal to the genus. They are more or less curved and contorted and usually measure 60–100 μ in length and about 10 μ in greatest diameter. The spirals are distinct and deeply pigmented with yellowish brown. There are usually two spirals running from end to end, but one or both of these may branch, so that the elater may show three or four spirals through a part of its length. The thin part of the wall sometimes disappears at maturity. The elaters taper somewhat, the ends themselves being either sharp-pointed or blunt.

Although the difference in the elaters is so striking, the lack of other differential characters separating *F. cristula* from *F. foveolata* is somewhat disconcerting. Might it not be possible that the reduced elaters of *F. cristula* were the result of unfavorable conditions during the development of the sporophyte? At the present time there is no evidence to support such an idea. The capsules of *F. cristula* present no appearance of incomplete or abnormal development, and reduced elaters of the *F. cristula* type have not been reported from Europe, where *F. foveolata* is as common as in North America. The only observations which have any bearing on the question are those of Macvicar [1] in his discussion of *F. echinata* Macv. and *F. caespitiformis* De Not., two species of Europe and northern Africa. He finds that the elaters here sometimes become shorter and thicker than is usual, and he associates this condition with incomplete development. These thick elaters, however, still show distinct spirals so that they do not simulate very closely the annular elaters of *F. cristula*. Until evidence is brought forward showing that *F. cristula* is an undeveloped abnormal form of *F. foveolata*, it seems justifiable to regard it as a valid species or, at any rate, as a "kleine Art."

Austin proposed *F. cristula* nearly fifty years ago, and its distinctness has been recognized by Lindberg,[2] Underwood, and Stephani. In spite of these facts no stations have been cited for the species except the original locality. A short time ago Dr. G. H. Conklin sent a slide of the Indiana material for examination with the suggestion that it might represent *F. cristula*. A comparison with the material in Austin's Hep. Bor.-Amer. showed that this suggestion was correct and led to a re-examination of the material preserved as *F. foveolata* in

[1] Rev. Bryol. **38** : 74. 1911.
[2] Acta Soc. Sci. Fenn. **10** : 533. 1875.

the writer's herbarium and in the collection of Miss Haynes. In this way the additional stations cited above were brought to light. They show that *F. cristula* has an extensive range in the eastern United States and indicate that it is a species of southern rather than of northern distribution.

2. Lophocolea alata Mitt.; Larter, Devon. Assoc. Adv. Sci. Litt. & Art 1906: 285; Macvicar, Jour. Bot. **45**: 260. 1907; Student's Handb. British Hepat. 235. *f. 1–6*. 1912. *L. cuspidata,* var. *alata* K. Müll.; Rabenhorst's Kryptogamen-Flora **6**: 803. 1911. On sandstone along the edge of a brook, Simsbury, Connecticut (*Miss Lorenz,* December, 1914). Although this is the first station to be recorded for North America, the species was discovered at Milford, Pennsylvania, in 1908, by G. E. Nichols and reported by the writer as *L. cuspidata* (Nees) Limpr.[1] It is known in Europe from Great Britain and France. The validity of *L. alata* as a species is not above question and there is even some probability that there are intergrading forms connecting it with *L. cuspidata*. At the same time it presents characters which usually make its recognition easy, and its known range in Europe is decidedly more restricted than that of *L. cuspidata,* from which it is presumably derived. In North America *L. cuspidata* is known only from the Pacific Coast eastward to the Rocky Mountains, so that this evidence also, incomplete as it is, would strengthen the claims of *L. alata* for acceptance.

The differences between *L. cuspidata* and *L. alata* are clearly described by both Macvicar and Schiffner.[2] In *L. cuspidata* the color is pale or yellowish green, the leaves are imbricated and bifid about one fourth, the lobes are subulate and acuminate, the median leaf-cells average about 30 μ in length, the perichaetial bracts are bifid about one third, with a narrow acute sinus and subulate, acuminate lobes, the bracteole is bifid in a similar way to about the middle or even beyond, and the perianth is sometimes destitute of wings, although narrow wings are occasionally present. In *L. alata* the color is a darker green, the leaves are less closely imbricated and less deeply bifid (usually about one fifth) with shorter lobes, the median leaf-cells average about 40 μ in length, the perichaetial bracts are less deeply bifid (about one fifth to one fourth) with a lunulate sinus and broader,

[1] Bryologist **13** : 34. 1910.
[2] Lotos **58** : [19]. 1910.

less acuminate lobes, the bracteole is bifid in much the same way as the leaves, and the perianth bears one or more usually broad wings along its angles. Additional differential characters taken from the sporophyte may be quoted from Schiffner. According to his account the spores in *L. cuspidata* average about 16 μ in diameter, and the elaters have two spirals throughout their entire length; in *L. alata*, on the other hand, the spores usually measure 19–21 μ in diameter, and the elaters at one or both ends have very often a single spiral for a considerable distance. Unfortunately the Simsbury specimens lack capsules, so that these observations could not be confirmed. In their gametophytic characters, however, they agree closely with the following English specimens: near Castleton, Derbyshire (*H. W. Pearson*, distributed in Hep. Europ. Exsic. *275*); Cuckfield, Sussex (*W. E. Nicholson*, communicated by Miss Lorenz).

Both *L. alata* and *L. cuspidata* are autoicous in their inflorescence and on this account frequently bear perianths. In *L. bidentata* (L.) Dumort., which agrees with them in many points, the inflorescence is dioicous and perianths are rarely developed. In the form of the leaves *L. bidentata* usually resembles *L. alata* more closely than it does *L. cuspidata*, but the leaf-cells are smaller than in either of the autoicous species and measure 25–30 μ in the middle of the leaf. The distribution of *L. bidentata* in New England is very incompletely known. Although it has been reported from every state except New Hampshire, the writer has seen specimens from Massachusetts and Connecticut only. It seems to be most at home on moist or wet sandstone.

3. CEPHALOZIA CATENULATA (Hüben.) Spruce, On Cephalozia 33. 1882. *Jungermannia catenulata* Hüben. Hep. Germ. 169. 1834. *J. reclusa* Tayl. Jour. Bot. **5**: 278. 1846 (in part). *Cephalozia reclusa* Dumort. Hep. Eur. 92. 1874. *C. serriflora* Lindb. Medd. Soc. F. et Fl. Fenn. **3**: 188. 1878. *C. virginiana* Spruce, On Cephalozia 37. 1882.

Hübener's *Jungermannia catenulata* has been the source of considerable confusion to students of the Hepaticae. It was based on specimens collected in western Germany, the habitat being described as "Torfboden in Sümpfen." According to the original description the lobes of the perichaetial bracts were entire. Spruce considered the species synonymous with Taylor's *J. reclusa* (in a restricted sense) and with Lindberg's *Cephalozia serriflora*, a species with dentate or

spinose bracts, usually growing on rotten logs. According to Spruce the bracts were variable in his *C. catenulata*, the lobes being sometimes entire and sometimes variously toothed. Certain later European writers considered Spruce's species an aggregate. In their opinion the plant with entire lobes represented the true *J. catenulata*, while the one with toothed lobes represented *J. reclusa* or *C. serriflora*. In accordance with these ideas the writer recommended eleven years ago that Lindberg's name be retained for the plant with toothed bracts. It was recommended further that Taylor's name be given up altogether. This suggestion was made because Taylor's species, although older, was based on several distinct plants. Just what the plant with entire lobes represented was not considered because no species answering to the descriptions was known from North America.

A year ago Schiffner [2] was able to clear up the confusion about *J. catenulata* by the study of specimens in the Nees von Esenbeck herbarium at Strassburg. He found that the bracts in this material, which was received from Hübener himself, were distinctly toothed and that the original description was therefore in error when it stated that they were entire. For this reason it becomes necessary to revive the name *C. catenulata* and to apply it to the species which has recently been known in North America as *C. serriflora*. Schiffner showed further that the plant with entire lobes deserved no special recognition, being apparently a mixture of *C. catenulata* and *C. macrostachya* Kaalaas.

It will be noted that *C. virginiana* is included among the synonyms of *C. catenulata*, in spite of the fact that it is accepted as valid by Stephani.[3] Spruce based this species on material collected at Portsmouth, Virginia, and preserved in the Schimper herbarium. He proposed it as new with reservations, emphasizing its close relationship to *C. catenulata*. According to his account the inflorescence in *C. virginiana* is either autoicous or dioicous, the latter condition being the more usual, the androecia are elongated, the perianth is wider above the middle, and its mouth is setulose or ciliolate. In *C. catenulata*, on the other hand, the inflorescence is invariably dioicous, the androecia are short, the perianth is not wider above the middle, and the mouth is setose or ciliate, in other words it has longer teeth. It

[1] Rhodora **6** : 173. 1904.
[2] Hedwigia **54** : 313. *text fig. 1–5.* 1914.
[3] Bull. de l'Herb. Boissier II. **8** : 375. 1908.

will be seen at once that the differences indicated are based on very variable characters. Through the kindness of Dr. Howe a portion of the type specimen in the Underwood herbarium has been available for study. Since this specimen shows no peculiarities sufficient to warrant a specific separation from *C. catenulata*, and since several European writers have demonstrated an occasional autoicous inflorescence in the latter plant, it seems justifiable to consider the two species synonymous. *C. catenulata* has been recorded from all six of the New England states.

4. CEPHALOZIA MACROSTACHYA Kaalaas, Rev. Bryol. **29**: 8. 1902. *C. multiflora*, var. *β elata* Spruce, On Cephalozia 38. 1902. In bogs. Rhode Island: Westerly (*A. W. E.*, April, 1911). Connecticut: North Branford (*W. R. Dudley*, August, 1882); Woodbury (*A. W. E.*, June, 1902); Bingham Pond, Salisbury (*A. W. E.*, June 1905); Berlin (*G. E. Nichols*, November, 1910); Andover (*A. W. E.*, July, 1911); New Haven (*A. W. E.*, April, 1915). Kaalaas based the present species on material collected by E. Ryan at Glemminge, Norway. Nine years after its original publication it was reported by Nicholson [1] from various localities in Sussex, England, and the following year it was recognized as valid by both Macvicar [2] and K. Muller.[3] The latter writer cited stations for the species from Denmark, as well as from Norway and England, and predicted its discovery in other regions. Later in the same year Schiffner [4] reported it from various localities in Bavaria, from the vicinity of Hamburg, and from Sweden, and last year [5] published the first record for North America, based on specimens collected at Freeport, Long Island, in October, 1898, by M. A. Howe. The stations given above extend its known range into southern New England, and it will probably prove to be as widely distributed on this side of the Atlantic as in Europe. The New England material has been compared with the various specimens distributed in Schiffner's Hepaticae Europaeae Exsiccatae and also with a portion of the Long Island material, kindly communicated by Dr. Howe.

In its dioicous inflorescence *C. macrostachya* agrees with *C. media*

[1] Hastings and East Sussex Nat. **1** : 274 *pl. 22, f. 10.* 1911.
[2] Student's Handb. British Hepatics 263. 1912.
[3] Rabenhorst's Kryptogamen-Flora 6^2 : 56. *f. 17.* 1912.
[4] Oesterr. Bot. Zeitschr. **62** 159. 1912.
[5] Hedwigia **54** : 321. 1914.

Lindb. and *C. catenulata* (Hüben.) Spruce, and in certain respects it is intermediate between these two species. According to Kaalaas the elongated antheridial spikes or androecia yield its most distinctive characters. In his description of these spikes he states that the bracts are numerous (sometimes as many as fourteen pairs); that they are two or three times as large as the leaves; that they are imbricated, transversely attached, and bifid (or rarely trifid) to the middle or beyond with acute sinuses; and that the lobes of the bracts are narrowly lanceolate and acute with more or less spinose-dentate margins. He adds that the lower bracteoles are smaller than the bracts but that the upper ones are fully as large and bifid in much the same way. Macvicar and Müller accept the characterization of Kaalaas and lay an equal emphasis on the androecia in distinguishing *C. macrostachya* from its allies.

Schiffner, however, brings out the interesting fact that androecia of the type described by Kaalaas are not of constant occurrence. He finds that the antheridial spikes are sometimes short, that the lobes of the bracts are sometimes entire or nearly so (except for a small tooth on the dorsal margin), and that the bracteoles are sometimes small throughout the length of the inflorescence. He finds further that spikes of this simpler type sometimes occur in connection with spikes of the more complex type and sometimes replace the latter altogether. As he points out the androecia of *C. media* agree in all essential respects with the simpler androecia just described, and it should be added that the androecia of *C. catenulata* agree almost as closely.

On account of the inconstancy of the characters drawn from the antheridial inflorescences Schiffner, in distinguishing *C. macrostachya* from *C. media*, lays emphasis on the shape of the leaves, the peculiarities of the perichaetial bracts, and the teeth at the mouth of the perianth. The features which he considers most important were, for the most part, brought out in the original description, although Kaalaas regarded them as less important than those drawn from the androecia. They may be briefly described as follows: the leaves are bifid to about the middle with an obtuse-lunulate sinus and straight or connivent, acute divisions, each usually tipped with a row of two cells; the perichaetial bracts are bifid to beyond the middle with long acuminate lobes, each usually bearing on the outer edge two slender and often hair-like teeth; the mouth of the perianth has small teeth,

some of which are usually elongated into slender cilia. The contrasting characters in *C. media* are the following: the leaves are usually less deeply bifid, and the lobes, which are nearly always connivent, are more shortly pointed, being usually tipped with a single cell instead of a row of two cells; the perichaetial bracts are less deeply bifid, the lobes are less acuminate, and each usually bears on the outer edge a single broader and often blunt tooth; the mouth of the perianth is minutely crenulate or setulose from cells projecting singly.

To these differences may be added a slight difference in the size of the leaf-cells. Schiffner criticises the measurements in Müller's description of *C. macrostachya*, where the cells are said to be 30–35 μ in diameter. He notes that the original description gives a length of 23–35 μ and a width of 19–23 μ, and he adds that he himself has found the cells to be about 20 μ in diameter. He suggests that Müller may have made his measurements toward the dorsal base of the leaf, where the cells are invariably larger. From a series of measurements made by the writer on various specimens the cells in the upper part of the leaves were found to average about 21 $\times$ 18 μ, while those in the basal region averaged about 30 μ in diameter. In *C. media* the corresponding averages were 30 $\times$ 24 μ and 35 μ.

In separating *C. macrostachya* from *C. catenulata*, the leaves and the perichaetial bracts are again of much importance. In this latter species the leaves are bifid to the middle or less with a narrow sinus and usually parallel acute lobes; the leaf-cells, which are about as large as in *C. macrostachya*, have somewhat thicker walls, and the perichaetial bracts are less deeply bifid with broader and less acuminate lobes, the margins of which are coarsely and irregularly dentate or spinose-dentate. *C. catenulata* rarely occurs in bogs, its usual habitat being rotten logs, while *C. macrostachya*, according to the information at hand, is confined to bogs.

It will be seen from the foregoing notes that the recognition of sterile material of *C. macrostachya* or of male material with androecia of the simpler type is beset with difficulties, and it is probably unwise to attempt a positive determination in all cases. For this reason the writer has left unnamed several specimens which he suspects belong to *C. macrostachya*. None of the American specimens so far examined has shown androecia of the complex type described by Kaalaas. All the androecia studied, however, except a few very short ones, have shown small but distinct bracteoles, structures which are usually absent altogether from the androecia of *C. media*.

The gemmiparous form of *C. macrostachya* is distinguished as var. *propagulifera* by Schiffner. He based this variety on a set of specimens collected by H. Paul at Bernau in Bavaria and distributed in Hep. Europ. Exsic. *547*. Schiffner states that the gemmiparous stems are terminated by a rather broad bud, which encloses a dense cluster of *Opuntia*-like chains of gemmae. He adds that the gemmae themselves are unicellular and clavate, measuring about 18 × 8 μ, that the leaves of the cluster are pointed and toothed in much the same way as the perichaetial bracts, and that underleaves similar to the bracts are likewise present. In No. 547 of the Yale herbarium most of the gemmiparous branches are very small (about 0.25 mm. in diameter), the leaves and underleaves are less sharply pointed and less toothed than Schiffner implies, and some of the largest gemmae measure 24 × 12 μ. These slight differences, however, might well come within the range of variation to be expected. In the material from Bingham Pond, Salisbury, which is likewise gemmiparous, some of the branches with gemmae proliferate and revert to an ordinary vegetative condition. When this takes place the gemmiparous leaves and underleaves become scattered along the elongated axis and show striking irregularities in shape, some of them being deeply divided into hair-like divisions. Here again the largest gemmae are about 24 × 12 μ, although many of them are of course considerably smaller. Both here and in the original Bavarian specimens the gemmae have slightly thickened walls and are occasionally vaguely angled.

5. CEPHALOZIELLA SPINICAULIS Douin, Rev. Bryol. **40**: 81. 1913. On rocks. Mt. Carmel, Hamden, Connecticut (*A. W. E.*, April, 1908). Cathedral Rock, West Hartford, Connecticut (*Miss Lorenz*, March, 1914). No other localities can be cited at the present time. According to the very brief description of Douin this species differs from all other members of the genus in having the stems covered with numerous projecting cells forming blunt teeth. Nothing more is told about the plant except that it is known in sterile condition only and that the material upon which it was based was collected by the present writer. In looking through the specimens of *Cephaloziella* which were submitted to Douin for determination it was found that the material from Mt. Carmel, cited above, was named *C. Hampeana* (Nees) Schiffn., a part being referred to the forma *typica* and a part to the new variety *spinicaulis* Douin. The latter plant, therefore, which fully agrees with Douin's description, probably represents the type of *C. spinicaulis*.

The projecting cells, which Douin emphasizes so strongly, are very striking. In extreme cases numerous cells of a superficial row project and form a narrow ridge, from the margin of which rounded or bluntly conical crenulations or denticulations arise, each consisting of one or two cells. All gradations occur between this extreme condition and that in which the projecting cells are isolated and irregularly scattered. No case has been observed, however, in which a stem was smooth for any considerable distance. It may be added that the walls of the cells are thin throughout. Both leaves and underleaves are well developed. The leaves, which are transversely attached or nearly so, spread at an angle of sixty degrees or less and are more or less concave. They are bifid nearly or quite to the middle with acute lobes and sinus. Their cells average about 10×8 μ and are thin-walled throughout. The margins of the leaves are sparingly crenulate or denticulate from projecting cells and the outer surface is roughened in much the same way as the stem; in other words it shows projecting cells, which are sometimes numerous, forming short and irregular ridges, and sometimes few and scattered. The underleaves are ovate and either pointed or shortly bifid at the apex. The margin and outer surface are much as in the leaves, although they tend to show fewer projecting cells.

Aside from its rough stems *C. spinicaulis* is much like *C. papillosa* Douin, a species recently reported by the writer [1] from Massachusetts and Connecticut. Although Douin implies that *C. spinicaulis* is the only species of the genus in which the stems are characterized by projecting cells, Howe,[2] in the description of his *Cephalozia divaricata scabra*, which is now considered a synonym of *C. papillosa*, states that the stems exhibit "rarely here and there minute paraphyllia-like appendages usually composed of two or three cells in a lineal series." If such structures were at all abundant they might throw doubt on the importance of the projecting cells in *C. spinicaulis* as a specific character. They must, however, be exceedingly rare because the writer has found no traces of them in most of the specimens of *C. papillosa* which he has examined. Under the circumstances, therefore, it seems justifiable to follow Douin in emphasizing the projecting cells and in considering *C. spinicaulis* a valid species. Unfortunately both the specimens studied are destitute of antheridia, archegonia, and gemmae.

[1] RHODORA **14** : 222. 1912.
[2] Mem. Torrey Club **7** : 129. 1899.

6. Calypogeia paludosa Warnst. Kryptogamenflora der Mark Brandenburg **2** : 1117. 1906. *C. Trichomanis,* var. *tenuis* Aust. Hep. Bor.-Amer. *74.* 1873. *Kantia Trichomanis,* var. *tenuis* Underw.; A. Gray, Manual, Ed. 6, 713. 1890. *Calypogeia tenuis* Evans, Rhodora **9** : 69. 1907. According to the Vienna Rules the present species should bear the name *C. paludosa,* although Austin recognized the plant much earlier than Warnstorf and gave it the varietal name *tenuis.* When the writer raised Austin's variety to specific rank he was unaware of Warnstorf's *C. paludosa,* published the preceding year in the supplement to his Kryptogamenflora. K. Müller considers *C. paludosa* a simple synonym of *C. sphagnicola* (Arn. & Perss.) Warnst. & Loeske, but Schiffner [1] has recently shown that this view cannot be maintained and that *C. paludosa* is more closely allied to *C. Trichomanis* (L.) Corda than to *C. sphagnicola.* In separating it from the latter species he finds differences in both gametophyte and sporophyte. In the gametophyte he emphasizes the fact that the leaf-cells of *C. paludosa* are thin-walled throughout while those of *C. sphagnicola* are thicker and show distinct trigones. He adds that the plants in *C. paludosa* are larger than in *C. sphagnicola,* that the leaves and leaf-cells are larger, and that the underleaves are less deeply bifid and have broader lobes.

In the sporophyte he brings out the following differences: in *C. paludosa* the cells of the outer layer of the capsule wall are in eight longitudinal rows on each valve and show no traces of local thickenings in their walls, the cells of the inner layer are in sixteen longitudinal rows and show annular bands of thickening, while the spores measure 12–14 μ in diameter; in *C. sphagnicola* the cells of the outer layer are in fourteen to sixteen longitudinal rows and usually show rod-like or band-like thickenings of the radial walls (some of which extend over a portion of the outer tangential wall), the cells of the inner layer are in twenty-four longitudinal rows and show annular thickenings (much as in *C. paludosa*), while the spores measure only 9–10 μ in diameter. In Schiffner's opinion it is the structure of the capsule which shows most clearly the close relationship of *C. paludosa* to *C. Trichomanis,* although he admits that the gametophytes of the two species sometimes resemble each other very closely. He reserves the name *C. Trichomanis* for plants with a paroicous inflorescence, *C. paludosa*

[1] Krit. Bemerk. über europ. Leberm. 13 : 8, 9. 1914.

being characterized by an autoicous inflorescence. In one specimen of *C. paludosa*, which he distinguishes as forma *subaquatica* (Hep. eur. exsic. *621b*) he found a single inflorescence with both antheridia and archegonia. This shows that *C. paludosa* is at least sometimes paroicous, but Schiffner still maintains it as a species because he has never found purely antheridial spikes in *C. Trichomanis*. His observations show that the claims of *C. paludosa* for recognition as a species rest on a rather insecure basis. It exhibits characters, however, which are usually easily recognized and there is little danger of confusing it with *C. Trichomanis* under ordinary circumstances. The plant is now definitely known from all six of the New England States.

The additions to local state floras, not already mentioned on the preceding pages, are as follows: —

For New Hampshire. *Pallavicinia Flotowiana*, Waterville (*Miss Lorenz*). *Lophozia Hatcheri;* Mt. Washington (*Miss Lorenz*).

For Vermont. *Chiloscyphus pallescens;* West Haven and Willoughby (*Miss Lorenz*). *Diplophyllum apiculatum;* Guilford (*Miss Lorenz*).

For Massachusetts. *Riccia arvensis;* New Marlboro (*Miss Lorenz*). *Ricciella crystallina;* Cheshire (*Miss Lorenz*). *Cephalozia fluitans* and *Mylia anomala;* Holden (*Miss Greenwood*).[1] *Anthoceros crispulus;* New Marlboro (*Miss Lorenz*).

For Connecticut. *Lophozia longidens;* foot of Pistapaug Mountain, Durham (*Miss Lorenz*).

The census of New England Hepaticae now stands as follows: Total number of species recorded, 184; number recorded from Maine, 128; from New Hampshire, 135; from Vermont, 119; from Massachusetts, 103; from Rhode Island, 78; from Connecticut, 140; common to all six states, 57.

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[1] Miss Greenwood has already reported these two species from Massachusetts. See Bryologist **18** : 8. 1915.

TWO PHILADELPHUS COMBINATIONS.

Albert Hanford Moore.

The well-known and loved fragrant shrub of every old-fashioned garden, the Common Syringa or Mock Orange, is a native of the Caucasus and Armenia and possibly of Europe, where it is at least thoroughly naturalized in some localities. It is very variable and easily passes by imperceptible gradations into a number of wild and horticultural varieties, most of which are cultivated in New England. One of the best known of these has commonly been called *P. satsumi* Sieb.,[1] but the original account of the supposed species thus named is a hopeless mixture of references to Japanese and American plants of quite different groups. The group including the American element is confined to the Western Hemisphere, in fact, the particular subgroup intended to the Southern States. It is thus a name which is a "permanent source of confusion and error."

P. satsumanus Sieb., according to Miq.,[2] and *P. coronarius* L. var. *satsumi* (Sieb.) Maxim.[3] are both based on *P. satsumi*. It is true that Rehder [4] attempts to rescue the name *P. satsumanus* by arguing that it is the first one whose description clearly applies to our plant, but the first synonym cited under it is *P. satsumi* Sieb., hence the author's purpose was evidently to replace the latter name by the name *P. satsumanus*. This intention to regard both names as equivalent is made yet clearer, not only by the obvious derivation of one from the other, but by the citation of Siebold as the authority for both. More than that, the new form of the name is plainly supposed to be an improvement on a native word by Latinization.

Whatever *P. satsumi* is, then, *P. satsumanus* is also, and, if, as is here true, *P. satsumi* is undeterminable, it logically follows that *P. satsumanus* ought to be discarded with it. Beyond the manifest intention of Miquel, we have neither right nor motive to go. The horticultural name *P. Yokohama* or *Yokohamae* is no better understood, for it also has been applied variously to our plant and to an ill-

[1] Fl. Gard. ii, 102 (1851–2).
[2] Ann. Mus. Bot. Lugd. Bat. iii, 99 (1867).
[3] Mém. Acad. Impér. Sci. St. Pétersb. ser. 7, no. 16, 40 (Feb. 9, 1867).
[4] Mitt. Deutsch. Dendrol. Gesellsch. 249–250 (1910).

defined phase of *P. Gordonianus*,[1] an American plant — surely a strange confusion.

Fortunately, there is an available name for our plant, which is a Chinese and Japanese variety having more acuminate leaves than the type, with conspicuous indurated teeth or serrations, evenly and rather distantly disposed, the long-acuminate tip often bent to one side, especially in wild specimens. Lange[2] describes a *P. acuminatus*. Koehne[3] cannot distinguish it from the plant currently known as *P. satsumi*. Schneider[4] also says that it is perhaps identical with *P. satsumi*, as usually interpreted. Authentic material together with Lange's figure seem to leave no doubt about this identity.

Our plant can hereafter be correctly known, therefore, as: PHILADELPHUS CORONARIUS L. var. **acuminatus** (Lge.) A. H. Moore, n. comb.

P. acuminatus Lge. Fortegn. Veterin. Landb. Forsthav. Charlottenl. Frilandst. 65 (1871); Bot. Tidsskr. ser. 3, ii, 131, pl. 2 (1877–9).

P. satsumi and *satsumanus* of authors.

P. coronarius L. var. *tomentosus* (Wall.) Hook. f. & Thoms.[5] is another variety of the old polymorphous species, this time, a Himalayan and Tibetan one. A specimen has been examined with the note, "Well established on rocky knoll near site of old greenhouse, Arlington, Mass.," which, while exhibiting some peculiarities, does not seem possible to refer elsewhere. The variety just mentioned is very hairy on the lower leaf-surfaces.

There are likewise several closely related species approaching the type or one of the varieties, which make the group a puzzling one.

In our Southern States one of the finest of the sweet-scented species is native, namely, *P. pubescens* Lois.[6] This species usually has longer racemes and handsomer foliage than *P. coronarius*, though the fragrance is not quite so strong or lasting. There is only one 'Mock Orange.'

[1] Presumably *P. Gordonianus* Lindl. Bot. Reg. xxiv, Misc. Notes, no. 21 (1838); xxv, pl. 32 (1839) = *P. Lewisii* Pursh, Fl. Am. Sept. i, 329 (1814).

[2] Fortegn. Veterin. Landb. Forsthav. Charlottenl. Frilandst. 65 (1871); Bot. Tidsskr. ser. 3, ii, 131, pl. 2 (1877–9).

[3] Deutsch. Dendrol. i, 180 (1893).

[4] Ill. Handb. Laubholzk. i, 371 (Feb. 2, 1905).

[5] Jour. Proc. Linn. Soc. (Bot.) ii, 83 (1858), *P. tomentosus* Wall. ex G. Don, Gen. Hist. Dichlam. Pl. ii, 807 (1832).

[6] Herb. Gén. Amat. iv, 268 (1820); *P. grandiflorus* P. W. Wats. Dendrol. Brit. i, pl. 46, 1825, not Willd.; *P. latifolius* Schrad. ex DC. Prod. Syst. Nat. Regn. Veg. iii, 206 (1828).

The leaves, the calyx, externally as well as internally, and the capsules are markedly pubescent.

Beadle [1] describes from Tennessee as a species, *P. intectus*, but it is only a variety which has the leaves, capsules, and outer surface of the sepals glabrous or relatively so.[2]

P. PUBESCENS Lois. var. **intectus** (Beadle) A. H. Moore, n. comb.

P. intectus Beadle, Bilt. Bot. Studies, i, 160 (1902).

The differences are thus comparable to those between *P. coronarius* and its variety, *tomentosus*, above.

WASHINGTON, D. C.

THE AMERICAN VARIATIONS OF LYCOPODIUM ANNOTINUM.

M. L. FERNALD.

THE disposition of the American plants ordinarily passing as *Lycopodium annotinum* L. has often been a source of some perplexity to students in our Northern States and British America. As commonly interpreted the species consists with us of the so-called typical *L. annotinum*, with leaves spreading, and var. *pungens* Desv., with shorter more rigid erectish leaves. The chief difficulties which field-botanists in the North have encountered have arisen from the fact that in the region from Newfoundland to the Great Lakes and eastern Pennsylvania there are two quite pronounced variations of *L. annotinum* with spreading or even reflexed leaves. A study of the material in the Gray Herbarium and the Herbarium of the New England Botanical Club, 184 numbers, shows that the species in North America falls into four, instead of two, rather pronounced tendencies, the typical form of the species crossing the continent, the three varieties each with more restricted distribution. The following synopsis may be of interest to others as a basis for the recognition of these four variations.

[1] Bilt. Bot. Studies, i, 160 (1912).

[2] Indeed, Beadle, l. c., says of it: "From *P. latifolius* Schrad. this species may be recognized by the glabrous or glabrate leaves and by the absence of pubescence on the hypanthium and exterior surface of the sepals."

Leaves mostly spreading or reflexed, those of the fruiting branches 5.5–11 mm. long.
Leaves lanceolate, linear-oblong or oblanceolate, thinnish, distinctly serrate.....*L. annotinum.*
Leaves linear- or lance-attenuate, firm and thickish, entire or obsoletely serrate.....var. *acrifolium.*
Leaves strongly ascending or appressed, those of the fruiting branches 2.5–6 mm. long.
Leaves linear- or lance-attenuate, thick, dorsally convex, entire. var. *pungens.*
Leaves lanceolate or lance-oblong, flat, obscurely serrate..var. *alpestre.*

L. ANNOTINUM L. Sp. Pl. 1566 (1753).— Eurasia and North America. Woods and clearings, Newfoundland to Alaska, south to Connecticut, New York, Michigan, Wisconsin, Colorado, Idaho and Washington.

Var. **acrifolium**, n. var., foliis lineari- vel lanceolato-attenuatis firmis crassis integris vel obsolete serratis patentibus vel reflexis.— Newfoundland to Pennsylvania, Michigan and Ontario; also Siberia. NEWFOUNDLAND: dry rocky clearings, Grand Falls, July 10, 1911, *Fernald, Wiegand, Bartram & Darlington*, no. 4366. QUEBEC: dry woods, Grindstone, Grindstone Island, Magdalen Islands, July 22, 1912, *Fernald, Bartram, Long & St. John*, no. 6696. PRINCE EDWARD ISLAND: dry open woods, Rocky Point, July 6, 1912, *Fernald & St. John*, no. 6695. NOVA SCOTIA: damp woods, North Sydney, July 21–25, 1901, *Howe & Lang*, no. 692. MAINE: woods, Fall Brook, north of St. Francis, July 21, 1908, *Churchill;* damp woods, Fort Kent, July 12, 1903, *Pease*, no. 2588; dry woods, Van Buren, July 24, 1893, *Fernald*, no. 213a; dry woods, Orono, October 13, 1890, *Fernald;* dry woods, Dover, September 4, 1894, *Fernald*, July 22, 1895, *Fernald* (TYPE in herb. New England Botanical Club). NEW HAMPSHIRE: White Mountains, 1842, *A. Gray*, July 28, 1853, *Wm. Boott;* ledge, Randolph, July 24, 1893, *E. F. Williams;* Shelburne, September, 1893, *Farlow;* summit of Starr King, September 15, 1897, *W. Deane;* woods, Colebrook, July 15, 1907, *Pease*, no. 10,443; foot of Moat Mt., North Conway, August 26, 1878, *W. C. Lane;* rich woods, Jaffrey, July 9, 1897, *Robinson*, no. 189; cold wet woods, Contoocook, October 11, 1899, *F. G. Floyd*. VERMONT: Jay Peak, July 7, 1908, *E. J. Winslow*. MASSACHUSETTS: Chebacco woods, Essex, September 19, 1896, *Raynal Dodge;* low woods, Cold Brook Springs, Oakham May 12, 1912, *Fernald & Wiegand;* woods, Ashfield, August 2, 1909, *E. F. Williams*, woods, Buckland, August 23, 1906, *F. F. Forbes*. CONNECTICUT: pine woods, Winchester, June 25, 1901, *C. H. Bissell*. PENNSYLVANIA: Moraine, Pocono Plateau, July 25, 1904, *J. W. Harshberger*. MICHIGAN: Hamlin Lake, Ludington, July 28, 1910, *R. W. Chaney*, no. 21; woods near Lake Michigan, August 17, 1901, *M. A. Barber*. ONTARIO: Onaman River, Thunder Bay District, 1912, *H. E. Pulling*. SIBERIA: River Pjosscha, Samojed, *Schrenk*.

Var. PUNGENS (La Pylaie) Desv. Mém. Soc. Linn. Paris, vi. 182

(1827); Spring, Mon. Lycop i. 78 (1841). *L. pungens* La Pylaie acc. to Desv. l. c.—Exposed rocky or peaty habitats, Greenland, Labrador and Newfoundland to the mountains of northern New England, the eastern coast of Maine, and northern Minnesota; also eastern Asia; and in the Tyrol (according to Luerssen).[1]

Var. ALPESTRE Hartm. Skand. Fl. ed. 2, 294 (1832).—Northern Europe and northwestern North America. BRITISH COLUMBIA: Mt. Arrowsmith, Vancouver Island, July 17, 1887, *J. Macoun*, no. 11,519. ALASKA: top of high hill, Ilinlink, Unalaska, October 1, 1871, *M. W. Harrington.*

Vars. *alpestre* and *pungens* seem to be the alpine and boreal extremes of the two woodland plants of more temperate habitats, true *L. annotinum* and var. *acrifolium.* It is specially noteworthy, therefore, that the flat- and broad-leaved var. *alpestre* of northern Europe should have been found in North America only at the northwestern edge of the continent, although in the East the flat- and broad-leaved typical woodland *L. annotinum* abounds. It is also noteworthy that the two plants with firm rigid entire and acerose-attenuate leaves, vars. *acrifolium* and *pungens*, widely distributed in northeastern America, should be unknown from western North America and rare or unknown in Europe, but both present in northern Asia. The ranges of these varieties thus fall essentially into the definite groupings — Europe and western America, eastern America and Asia — already familiar in hundreds of other cases.

GRAY HERBARIUM.

ANTENNARIA CANADENSIS IN PENNSYLVANIA.

HAROLD W. PRETZ.

IN his article, entitled "Southerly Range Extensions in Antennaria,"[2] Mr. Bayard Long makes the following statement: "Although *Antennaria canadensis* has not yet, to the best of my knowledge, been collected between the Catskills and Natural Bridge, I feel that

[1] Luerssen does not recognize var. *alpestre*, and it is probable that the plant of the Tyrol referred by him to the American var. *pungens* may prove to be the European var. *alpestre*.

[2] RHODORA XV. 121 (1913).

with future work in the Alleghanies its occurrence in Pennsylvania will be established."

With some material sent to the Academy of Natural Sciences in Philadelphia in the autumn of 1913 was an *Antennaria* collected on May 4th. of that year along the road near the Behrens Farm situated on the plateau about $3\frac{1}{2}$ miles northeast of East Mauch Chunk, Pennsylvania. Mr. Bayard Long referred the plant, though immature, to *A. canadensis* Greene, a determination that was later confirmed by Prof. M. L. Fernald, who fortunately happened to visit the Academy at this time.

This collection, though quite satisfactory as far as record was concerned, nevertheless made it highly desirable that more mature material be collected as well as that some data be secured relative to the local distribution of the plant. It was accordingly arranged that the following spring a joint trip by Mr. Long and the writer be made to the region of this collection. On May 16, 1914, Mr. Long visited the writer and on the morning of the 17th., in company with Messrs. E. S. and W. I. Mattern, the writer's companions in field work, a start was made for this region which lies about thirty miles distant to the northwest of Allentown, Pennsylvania.

This plateau or mountain region is known as the Pohopoco Mountains, but it is really a part, or extension to the west and southwest, of the well known Pocono Plateau. The continuation of the plateau still further west across the "Gorge" of the Lehigh river is known as Broad Mountain. Botanically the entire plateau region offers a most interesting field, but it would be quite outside the scope of this note to make any further reference to it except to note that the immediate region of this collection is south of the Terminal Moraine and that the Canadian is not so strong an element in this association as in that of the typical Pocono region, which is so rich in species of general Canadian association.

East Mauch Chunk lies along the Lehigh river practically against an escarpment of this general plateau region. It is built on a hill well above the level of the river. At the highest point in the town there are several open fields, and as Antennarias were the chief object of this excursion into the region a stop was made here. It took but a few minutes to discover *A. canadensis* in fair frequency in this field. It grew in isolated patches, or mats, and quite agreed in form and habit with the plant as Mr. Long knew it in its northern range.

Associated with it in the same field were *A. fallax* Greene, *A. neodioica* Greene, *A. neglecta* Greene and *A. Parlinii* Fernald. The elevation of this field according to Mr. W. B. Tombler, City Engineer of East Mauch Chunk, is 829.5 feet.

From this point a single road leads gradually up the steep escarpment to the plateau. This road crosses the plateau and finally reaches the "Poconos," passing several places where there are farms or clearings. Other roads branch off in different directions. The roadsides and clearings in the vicinity of these farms offer the most favorable habitats for Antennarias, for commonly a rather dense scrub association closely borders the roads.

There were few Antennarias seen on the trip of several miles across the plateau past the clearings but in the vicinity of the Behrens Farm where the original collection was made, two small mats of *A. canadensis* were found less than $\frac{1}{2}$ mile apart. The elevation of the plateau at this point is approximately 1600 feet. Shrubby vegetation was coming into leaf in the valley near East Mauch Chunk, but was less advanced on the plateau, and Mr. Long observed that the Scrub Oak here was advanced in seasonal growth about as far as the same species on the New Jersey coastal plain noted by him a month previous. Though the rest of the day was pleasantly spent in the region no more *A. canadensis* was seen.

Since this trip was made the writer has crossed Broad Mountain but no *A. canadensis* was discovered though it was looked for. At one place only along the "pike" over Broad Mountain, extending from near Mauch Chunk to Hudsondale, *A. neodioica* was seen. This species was seen also along the railroad near Hudsondale. Rain unfortunately prevented the thorough examination of some promising areas near Weatherly, and in crossing them only *A. neodioica* was seen. Other brief excursions have been made into the higher mountains further north by northwest, but no *A. canadensis* has been discovered. Possibly, as Mr. Long suggests, the lower, rather than the higher, slopes of the Alleghanies may prove to be the more favorable habitats.

In the writer's own county of Lehigh, Pennsylvania, Antennarias are frequent to abundant. Although plants referred to *A. petaloidea* and *A. occidentalis*, both of northern distribution, have been collected, no *A. canadensis* has been discovered although it has been diligently looked for. The occurrence of *A. petaloidea* is based upon a single collection in the upper Perkiomen Valley in the vicinity of the South

Mountains. The identification of this species has been confirmed by Prof. Fernald. *A. occidentalis* has been collected twice but in one case the material is not thoroughly characteristic and in the other it consists of difficultly identifiable staminate plants. The county is rather definitely Alleghanian in its plant life, as has been shown through an intensive study of the flora for a number of years, and the occurrence of *A. canadensis*, which Mr. Long in his article has shown to be of Canadian association, is hardly to be expected here unless it be found to occur as an isolated extension, as is apparently the case in the county with the above mentioned species.

The Mauch Chunk region, however, contains a much more definite Canadian element in its plant associations. *A. canadensis* occurs there in at least three stations while careful search has not revealed its presence in Lehigh county. *A. Parlinii*, though, has been collected only at a single station near Mauch Chunk, and none has been noted in the mountain country explored to the northward, but its wide distribution in Lehigh county is known by a series of collections from the vicinity of the Kittatinny mountains in the extreme north to the upper Perkiomen Valley in the extreme southern portion. All this is rather suggestive of the correctness of Mr. Long's understanding of the life associations of these plants.

ALLENTOWN, PENNSYLVANIA.

The JOSSELYN BOTANICAL SOCIETY OF MAINE will meet at Waterville, August 10, 1915. Headquarters at the Elmwood House. Further notice, with program, will be sent to members and to any persons interested two weeks previous to the meeting.— DANA W. FELLOWS, Secretary, Portland, Maine.

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SOME NEGLECTED NAMES IN WALTER'S FLORA CAROLINIANA.

S. F. Blake.

The first general descriptive flora of any part of the United States using the binomial system was Walter's Flora Caroliniana, published at London in 1788 by John Fraser, who had met Walter in Carolina in 1785 and brought back to England the manuscript of the work. The Walter herbarium, after being in the possession of the Fraser family for many years after Walter's death in 1788, was presented in 1849 to the Linnaean Society and purchased for fifteen shillings by the British Museum in 1863. The specimens, occupying 117 pages in a large volume, are arranged alphabetically for the most part, with the grasses [1] and the few extant types of Walter's new genera at the end. As already remarked by Britten [2] and Hitchcock,[3] many of Walter's types are missing and some of those which remain are in poor condition. In many cases, in genera wherein Walter described new species as well as Linnaean, no trace of the former can be found, while the latter which could so well be spared are represented by identifiable specimens. Many of the plants are labeled only with the generic name, and, in such cases as that of *Chironia* (= *Sabatia*), whose six species of the Flora are represented by seven specimens, it is often a matter of some difficulty to determine which should be considered the types, from the general insufficiency of Walter's descriptions. Even where there is a named specimen it is sometimes, although rarely,

[1] The grasses of the Walter collection have been the subject of a paper by A. S. Hitchcock (16th Rep. Mo. Bot. Gard. 31 (1905)).

[2] Britten, Journ. Bot. xxxvii. 485 (1899).

[3] Hitchcock, 16th Rep. Mo. Bot. Gard. 32 (1905).

unidentifiable, as in the case of *Delphinium caroliniamum* Walt., which has been a nomen dubium since its description and is likely to remain so, the type consisting merely of a naked scrap of stem three inches long. But in most cases, with the help of the indications given by Michaux and Elliott, it is possible to identify Walter's species very definitely.

The labels attached to the specimens are, as already mentioned, rather unsatisfactory, many of them bearing only the generic name, and there are frequent evidences of confusion in the collocation of label and specimen. What I take to be Walter's own handwriting is shown on a label without specimen of *Spiraea trifoliata*, and on the labels of *Syntherisma villosa* and *Vincetoxicum;* but most of the remaining labels are in another hand, which from its agreement with some writing on the title page of the volume may be affirmed with considerable certainly to be that of John Fraser himself, into whose keeping the collection passed, presumably on the death of Walter. Mr. James Britten, who has examined the evidence, agrees with me that the authorship of these handwritings may be regarded as practically established. Most of the errors in association of labels and specimen, it should be stated, are in the case of tickets in the handwriting of Fraser.

Although thirty-two new genera were indicated by Walter, only four [1] (*Syntherisma, Frasera, Amsonia, Vincetoxicum*) were actually named; for all the others the same pseudonym *Anonymos* was used. By far the greater part of these were really new at the time, and nearly all were provided with names by J. F. Gmelin three years later in his (thirteenth) edition of Linnaeus' Systema; but most of Gmelin's names were long disused and have been replaced by others now sustained as nomina conservanda by the Vienna Congress. The specific names used by Walter under his twenty-eight genera called *Anonymos* are today kept up where valid (except in a few cases hitherto overlooked), which seems the proper treatment to pursue with them, although it might be assailed with a show of justice in instances where the identical name is given to two or more species in different parts of the Flora. Thus there are four plants called *Anonymos aquaticus*, two called *A. repens*, and six called *A. caroliniensis*.[2] It

[1] A comparison of Walter's description of his *Rajania* (*R. ovata* Walt. = *Brunnichia cirrhosa* Gaertn., published in the same year) with that of Linnaeus is sufficient to prove that the former was not intended by Walter as a new genus.

[2] It may be well to call attention to the fact that this name was always spelt "*caroliniensis*" by Walter, who should be followed in this respect, although most authors who have adopted his names have written it "carolinensis."

seems to the writer, however, that these names should not be rejected on the ground of homonymy, since the genera under which they were published, though unfortunately all provided with the same apology for a name, were properly described and differentiated, and the case is therefore not comparable with that of identical specifics in the same genus.

Very many of Walter's new names have been in long-continued use, and some others must remain doubtful on account of the absence of specimens and the insufficiency of Walter's descriptions; but the twenty-odd changes here proposed on the basis of a careful study of Walter's herbarium in connection with his Flora are believed to be beyond reasonable doubt: several indeed have already been proposed by others.

1. *Anonymos caroliniensis* Walt. Fl. Car. p. 60 = ELYTRARIA CAROLINIENSIS (Walt.) Pers. Syn. i. 23 (1805). This displaces *E. virgata* Michx. Fl. i. 9, t. 1 (1803). No specimen in Walter Herbarium. The narrow-leaved variety from Florida should be called E. CAROLINIENSIS (Walt.) Pers. var. **angustifolia** (Fernald) Blake (*E. virgata* var. *angustifolia* Fernald, Bot. Gaz. xxii. 169 (1896); *Tubiflora caroliniensis angustifolia* (Fernald) Small, Fl. S. E. U. S. ed. 1. 1082 (1903)).

2. *Anonymos umbrosus* Walt. p. 63 = MICRANTHEMUM **umbrosum** (Walt.) Blake (*M. orbiculatum* Michx. Fl. i. 10. t. 2 (1803)). No specimen, but the description perfectly definitive of this species.

3. *Anonymos caroliniensis* Walt. p. 91 = LITHOSPERMUM CAROLINIENSE (Walt.) MacM. Metas. Minn. Vall. 438 (1892) (as *L. carolinense*) displacing *L. Gmelini* (Michx.) Hitchc. (1894). No specimen.

4. *Convolvulus speciosus* Walt. p. 93 = IPOMOEA SPECIOSA (Walt.) Hall. fil. Bot. Jahrb. xviii. 143 (1893) (*I. sagittata* Poir. Voy. Barb. ii. 122 (1789)).

5. *Anonymos pinnatus* Walt. p. 103 = PETALOSTEMUM **pinnatum** (Walt.) Blake (*P. corymbosum* Michx. Fl. ii. 50 (1803); *Kuhnistera pinnata* (Walt.) Ktze. Rev. Gen. i. 192 (1891)). A very poor specimen is in the herbarium.

6. SIUM SUAVE Walt. p. 115 (*S. cicutaefolium* J. F. Gmel. Sys. ed. 13. ii. 482 (1791)). Although *S. cicutaefolium* is quoted in the seventh edition of Gray's Manual (p. 615) as of Schrank, it was first published as a binomial by Gmelin, having been used in a varietal or subspecific sense by Schrank (Baier. Fl. i. 558 (1789)) in the form *Sium Berula*

Gouan III. *cicutaefolium*, based on the *Sium foliis pinnatis, pinnis lanceolatis, rarius serratis* of J. G. Gmelin (Fl. Sib. i. 201. t. 47 (1747)), from the Obo River in Siberia. J. F. Gmelin's name was based on the same citation from the Flora Sibirica, but he makes no reference to Schrank's name although his own was not improbably founded upon it. Walter's *Sium suave* is evidently the same species and has three years' precedence. There is no specimen so named in the Walter Herbarium, but there is a specimen of this species labeled *Eryngium* in the handwriting attributed to Fraser.

7. Rhexia Alifanus Walt. p. 130 (*R. glabella* Michx. Fl. i. 222 (1803). No specimen. The change here proposed has recently been made by Harper (Bull. Torr. Club, xli. 567 (1914)).

8. *Andromeda reticulata* Walt. p. 137 = Leucothoe populifolia (Lam.) Dippel, Handb. Laubh. i. 356 (1889).— *Andromeda populifolia* Lam. Ency. i. 159 (1783); *A. lucida* Jacq. Coll. i. 95 (1786) & Icon. i. t. 79 (1781–1786), not *A. lucida* Lam.[1] Ency. i. 157 (1783); *A. acuminata* Ait. Hort. Kew. ii. 70 (1789); *Leucothoe acuminata* (Ait.) G. Don, Gen. Sys. iii. 832 (1834).— The types of *Andromeda reticulata* Walt. and *A. populifolia* Lam., both of which I have examined, represent the species commonly known as *Leucothoe acuminata* (Ait.) G. Don, which must become *L. populifolia* (Lam.) Dippel.

9. *Thymbra ? caroliniana* Walt. p. 162 = Macbridea **caroliniana** (Walt.) Blake (*M. pulchra* Ell. ex Nutt. Gen. ii. 36 (1818); Ell. Sk. ii. 86 (1824)). Walter's description is definitive of this species, which according to Elliott is abundant in some places in the Carolinas, and his name *Thymbra ? caroliniana* is unhesitatingly referred by Elliott to his new species. No specimen.

10. *Scutellaria caroliniana* Walt. p. 163 = Scutellaria ovata Hill, Hort. Kew. ed. 1. 242 (1768); ed. 2. 242. t. 8 (1769) (*S. versicolor* Nutt. Gen. ii. 38 (1818)). The synonymy of this species is somewhat confused. The species was described by Hill as *S. ovata* in the first edition of the Hortus Kewensis in 1768; it was redescribed in better fashion and passably figured by Hill as a new species *S. pilosa* in volume xiii. (p. 64. t. 80) of the Vegetable System, which though dated 1773 is known to have been published in the same year (1768) as the Hortus Kewensis. In the second edition of the Hortus, pub-

[1] Lyonia lucida (Lam.) K. Koch, Dendr. ii. pt. 1. 118 (1872), replaces *L. nitida* (Bartr.) Fernald, Rhodora x. 53 (1908) (*Andromeda nitida* Bartr. ex Marsh. Arb. 8 (1785)).

lished in 1769, practically a reprint of the first but with the addition of twenty plates reduced from the Vegetable System, the plant reappears as *S. ovata* (p. 242) with a reduced and reversed copy of the plate in the Vegetable System, where it had been called *S. pilosa*. There seems to be no way of deciding definitely as to the priority of the first edition of the Hortus over the thirteenth volume of the System, or vice versa. However, as the twelfth volume of the latter work, published in 1767 (but dated 1773), is quoted at various places in the Hortus, while the thirteenth is not, it seems probable that the Hortus appeared before the thirteenth volume of the System. They were clearly all under preparation at the same time, for some species first published in the twelfth volume (1767) are also published as "Species Novae" in the Hortus of 1768, and reappear under this same title, with the addition of plates from the twelfth volume of the System, in the second edition of the Hortus in 1769, with references to the plates of the twelfth volume. Accordingly it seems wisest to adopt the name *Scutellaria ovata* Hill in place of *S. versicolor* Nutt., particularly since this course permits according to International Rules the retention of the well-known name *S. pilosa* Michx. for that species, which would otherwise require to be changed to *S. ovalifolia* Pers. The types of *S. versicolor* Nutt. and *S. caroliniana* Walt., both in the British Museum, are identical with the plant here taken as *S. ovata* Hill. *S. caroliniana* Poir. (Ency. vii. 106 (1806)), the type of which I have examined at Paris, is *S. integrifolia* L.

In the Hortus Kewensis of Hill his *S. ovata* was described as follows: "Caulis bipedalis, ramosus, subhirsutus. Folia ovata. Flores axillares, rubescentes. Biennis. Ex America boreali. Julio florens." In the System a better description was given: "Scutellaria Pilosa. The Leaves are hearted, nurled, and obtuse: the Twigs are downy. This is a Perennial, native of North America; a Plant of two feet high, flowering in July. The Stalk is brown: the Leaves are of a dull dead green: the Flowers are crimson: and the Seed-vessels of a dusky reddish hue." Despite Hill's description of the flowers as reddish, changed to "crimson" in the System, his character is otherwise so applicable and the peculiar fruit of the species is so naturally, if sketchily, represented in his figure that the identification of his plant with Nuttall's *S. versicolor* seems perfectly safe. Mr. James Britten has kindly called my attention to a fourth publication of this species as new (as *S. pilosa*) by Hill in vol. xvii. (p. 19 t. 20) of the

Vegetable System in 1770 ("1773") where a more detailed description is given.

The variety with enlarged floral bracts, those of the lower flowers 2 cm. long, should be known as S. OVATA Hill var. **bracteata** (Benth.) Blake (*S. versicolor* Nutt. var. *bracteata* Benth. Labiat. 433 (1832–1836)). Specimens have been examined from TEXAS: Rio Brazos, 1834, *Drummond* (type coll.: Brit. Mus.); without definite locality, 1846, *Lindheimer* III 492 (Brit. Mus.).

11. *Prasium? purpureum* Walt. p. 166 = PHYSOSTEGIA **purpurea** (Walt.) Blake (*P. denticulata* (Ait.) Britton, Mem. Torr. Club, v. 284 (1894); *Dracocephalum denticulatum* Ait. Hort. Kew. ii. 317 (1789)). Two specimens marked *Prasium* are in the Walter Herbarium (p. 87). The right-hand specimen, with sharply mucronate-serrate lanceolate leaves, which agrees with Walter's description of his *Prasium ? incarnatum*, is *Physostegia virginiana* (L.) Benth., while the other, with linear-lanceolate crenate-dentate leaves, typifies *Prasium? purpureum* Walt. and is the same as *Physostegia denticulata* (Ait.) Britton.

12. *Anonymos caroliniensis* Walt. p. 168 = RUELLIA CAROLINIENSIS (Walt.) Steud. Nom. ed. 2. ii. 481 (1841) (as *R. carolinensis*), displacing *R. ciliosa* Pursh, Fl. ii. 420 (1814). The small-flowered variety becomes R. CAROLINIENSIS (Walt.) Steud. var. **parviflora** (Nees) Blake (*Dipteracanthus ciliosus* (Pursh) Nees γ. *parviflora* Nees in A. DC. Prod. xi. 123 (1847); *R. ciliosa* Pursh var. *ambigua* Gray, Syn. Fl. ii. pt. 1. 326 (1878); *R. ciliosa parviflora* (Nees) Britton, Mem. Torr. Club, v. 300 (1894)). No specimen.

13. *Anonymos cassioides* Walt. p. 171 = SEYMERIA **cassioides** (Walt.) Blake (*S. tenuifolia* Pursh, Fl. ii. 737 (1814); *Afzelia cassioides* (Walt.) J. F. Gmel. Sys. ed. 13. ii. 927 (1791); *Gerardia cassioides* (Walt.) Pers. Syn. ii. 154 (1806[1])). No specimen in Walter Herbarium. *Seymeria* Pursh (l. c. 736) is a nomen conservandum.

14. HYPERICUM DENTICULATUM Walt. p. 190 (*H. virgatum* Lam. Ency. iv. 158 (1797); *H. angulosum* Michx. Fl. ii. 78 (1803)). No specimen, but the description unquestionably applicable to this species. The very narrow-leaved southern form becomes H. DENTICULATUM Walt. var. **acutifolium** (Ell.) Blake (*H. acutifolium* Ell. Sk. ii. 26 (1824); *H. virgatum* Lam. var. *acutifolium* (Ell.) Coult.

[1] Although the second volume of Persoon's Synopsis is dated 1807, its first section (pp. 1–272) was issued in the autumn of 1806, as is shown by a review in the Regensb. Bot. Zeit. v. 321 (21 Nov. 1806).

Bot. Gaz. xi. 106 (1886)); the broad-leaved form hitherto chiefly known from New Jersey, of which good specimens collected by Rugel (number 370) in wet swamps of the Swanano Valley, North Carolina, in August 1841, are in the British Museum, becomes H. DENTICULATUM Walt. var. **ovalifolium** (Britton) Blake (*H. virgatum ovalifolium* Britton, Trans. N. Y. Acad. Sci. ix. 10 (1889)). Var. *ovalifolium* differs from both the other forms of the species not only in leaf-form but in its larger ovate or elliptic-oblong sepals, but does not seem specifically distinct.

15. PRENANTHES AUTUMNALIS Walt. p. 193 (*P. virgata* Michx. Fl. ii. 83 (1803)). A good specimen is in the Walter Herbarium. All authorities, including Michaux himself, have referred Walter's *P. autumnalis* to *P. virgata*, but have failed to adopt the prior name. The *Prenanthes alba* β of Linnaeus (Sp. ii. 798 (1753)), based on *Clayton* 319, now in the British Museum, is also this species.

16. *Hyoseris biflora* Walt. p. 194 = KRIGIA **biflora** (Walt.) Blake (*Krigia amplexicaulis* (Michx.) Nutt. Gen. ii. 127 (1818); for full synonymy see Standley, Contr. U. S. Nat. Herb. xiii. 356 (1911)). No specimen.

17. *Chrysocoma acaulis* Walt. p. 196 = VERNONIA ACAULIS (Walt.) Gleason, Bull. N. Y. Bot. Gard. iv. 222 (1906) (*V. oligophylla* Michx. Fl. ii. 94 (1803)). No specimen in Walter Herbarium.

18. *Gnaphalium undulatum* Walt. p. 203 (not of L.) = PTEROCAULON PYCNOSTACHYUM (Michx.) Ell. Sk. ii. 324 (1824). Walter's *G. undulatum*, a pure misidentification of the Linnaean *G. undulatum* (Sp. ed. 1. ii. 852 (1753); ed. 2. ii. 1197 (1763)), has been taken up by Small as *Chaenolobus undulatus* (Walt.) Small, Fl. S. E. U. S. ed. i. 1236 (1903). This generic name by the way, was not *Chaenolobus* but *Chlaenobolus* (Cass. Dict. Sci. Nat. xlix. 337 (1827)), from χλαῖνα *cloak*, and βάλλειν *to throw*, in allusion to the deciduous scales of the involucre, and it is antedated by Elliott's *Pterocaulon* of 1824. Walter's misidentification of the Linnaean species has no claim to adoption in nomenclature.

19. *Perdicium semiflosculare?* Walt. p. 204 (not of L.) = CHAPTALIA TOMENTOSA Vent. Jard. Cels. 61. t. 61 (1800). Walter's specific name, although printed in italics as was his usual custom with new species, is clearly only intended as a doubtful identification of his plant with *Perdicium semiflosculare* L. (Amoen. Acad. vi. 103 (1763)) from the Cape of Good Hope, the diagnosis of which in the second edition of the Species Plantarum (ii. 1248 (1763)) is quoted nearly

verbatim by Walter, with the addition of a description of the leaves. Although adopted by Kuntze as *Thyrsanthema semifloscularc* (Walt.) Ktze. (Rev. Gen. i. 369 (1891)), and by Robinson as *Chaptalia semi-floscularis* (Walt.) Rob. (Proc. Am. Acad. xlv. 412 (1910)), Walter's name — a mere misidentification of Linnaeus' — should obviously not be adopted to the overthrow of the properly published *Chaptalia tomentosa* Vent. The fact that Linnaeus' species is now treated as a *Gerbera* can have no influence on the invalidity of Walter's use of the name. There is a good specimen in the Walter Herbarium.

20. ARETHUSA RACEMOSA Walt. p. 222 = PONTHIEVA **racemosa** (Walt.) Blake (*P. glandulosa* (Sims) R. Br. in Ait. Hort. Kew. ed. 2. v. 200 (1813); *Neottia glandulosa* Sims, Bot. Mag. t. 842 (1805)). There is an excellent specimen in the Walter Herbarium.

21. *Arethusa spicata* Walt. p. 222 = HEXALECTRIS SPICATA (Walt.) Barnhart, Torreya, iv. 121 (1904). Walter's name is very properly taken up by Barnhart in place of the later *H. aphylla* (Nutt.) Raf. There is no specimen, but Walter's description is qui e distinctive of this species rather than of *Aplectrum hyemale* (Muhl.) Torr., to which his name has been referred by some.

22. SALIX ALPINA Walt. p. 243 (*S. tristis* Ait. Hort. Kew. iii. 393 (1789)). This unfortunate change is required by the "International Rules," although not by the "American Rules." The only previous *S. alpina* is of Scopoli, Fl. Carn. ed. 2. 255. t. 61 (1772), described by Scopoli as doubtfully distinct from *S. lanata* L. and *S. fusca* L., and not kept up by any modern author. Andersson (in A. DC. Prod. xvi. pt. 2. 248, 289 (1868)) refers *S. alpina* Scop. in part to *S. Myrsinites* L., in part to *S. Myrsinites* L. β *Jacquiniana* (Willd.) Anders., and in part to *S. arbuscula* L. α *erecta* Anders. f. 3. *angustifolia* Anders. Walter's homonym is consequently available and must be adopted, inappropriate as it is, according to the "Vienna Rules." Walter's description is clearly of *S. tristis*, and there is a specimen of that species in his herbarium, labeled "Salix minor ? of Fraser," not in Walter's hand, which may well have referred to this species, was never published.

The changes here proposed may be summarized in systematic order as follows, the numbers referring to the preceding list:

(20) PONTHIEVA RACEMOSA (Walt.) Blake — *P. glandulosa* (Sims) R. Br.

(21) HEXALECTRIS SPICATA (Walt.) Barnhart — *H. aphylla* (Nutt.) Raf.

(23) Salix alpina Walt. — *S. tristis* Ait.

(5) Petalostemum pinnatum (Walt.) Blake — *P. corymbosum* Michx.

(14) Hypericum denticulatum Walt.— *H. virgatum* Lam.

(14) H. denticulatum Walt. var. ovalifolium (Britton) Blake — *H. virgatum* Lam. var. *ovalifolium* Britton.

(14) H. denticulatum Walt. var. acutifolium (Ell.) Blake — *H. virgatum* Lam. var. *acutifolium* (Ell.) Coult.

(7) Rhexia Alifanus Walt.— *R. glabella* Michx.

(6) Sium suave Walt.— *S. cicutaefolium* J. F. Gmel.

(8) Leucothoe populifolia (Lam.) Dippel — *L. acuminata* (Ait.) G. Don.

(8) Lyonia lucida (Lam.) K. Koch — *L. nitida* (Bartr.) Fernald.

(4) Ipomoea speciosa (Walt.) Hall. fil.— *I. sagittata* Poir.

(3) Lithospermum caroliniense (Walt.) MacM.— *L. Gmelini* (Michx.) Hitchc.

(10) Scutellaria ovata Hill — *S. versicolor* Nutt.

(10) S. ovata Hill var. bracteata (Benth.) Blake — *S. versicolor* Nutt. var. *bracteata* Benth.

(9) Macbridea caroliniana (Walt.) Blake — *M. pulchra* Ell.

(11) Physostegia purpurea (Walt.) Blake — *P. denticulata* (Ait.) Britton.

(2) Micranthemum umbrosum (Walt.) Blake — *M. orbiculatum* Michx.

(13) Seymeria cassioides (Walt.) Blake — *S. tenuifolia* Pursh.

(1) Elytraria caroliniensis (Walt.) Pers.— *E. virgata* Michx.

(1) E. caroliniensis (Walt.) Pers. var. angustifolia (Fernald) Blake — *E. virgata* Michx. var. *angustifolia* Fernald.

(12) Ruellia caroliniensis (Walt.) Steud.— *R. ciliosa* Pursh.

(12) R. caroliniensis (Walt.) Steud. var. parviflora (Nees) Blake — *R. ciliosa* Pursh var. *parviflora* (Nees) Britton.

(17) Vernonia acaulis (Walt.) Gleason — *V. oligophylla* Michx.

(18) Pterocaulon pycnostachyum (Michx.) Ell.— *Chaenolobus undulatus* (Walt.) Small.

(19) Chaptalia tomentosa Vent.— C. *semifloscularis* (Walt.) Rob.

(16) Krigia biflora (Walt.) Blake — *K. amplexicaulis* (Michx.) Nutt.

(15) Prenanthes autumnalis Walt.— *P. virgata* Michx.

London, England.

SISYMBRIUM BRACHYCARPON AND ALLIES.

J. FRANCIS MACBRIDE.

DR. EZRA BRAINERD recently sent to the Gray Herbarium for examination some specimens of a *Sisymbrium* collected both in Vermont and New York on the borders of Lake Champlain. These were evidently referable to *S. canescens* Nutt. var. *brachycarpon* (Richards) Wats. as treated in Gray's Manual, Seventh Edition. An examination of the large amount of material now available has led to the conclusion that this plant is specifically distinct from the mostly more southern *S. canescens*. The decidedly greener hue, more deeply segmented leaves, and remote simple viscid or glandular trichomes on the stems toward or quite to the base are characters that seem constant enough over a large area to justify its separation. The southern plant reaches its typical development in the southeastern states, and there is canescent with a soft rather coarse stellate pubescence, especially toward the base, the leaf-segments are short and rounded, and glandulosity, if present, is either confined to the upper portions of the plant or mingled with the pubescence, never standing out as simple distinct trichomes as in *S. brachycarpon*.

Dr. Rydberg, Fl. of Col. 158, gives as a character of *Sophia pinnata* (*S. canescens*), "style obsolete," and in Bull. Torr. Club, xxxiv. 436, after describing *Sophia magna*, writes, "It was first mistaken for *S. brachycarpa;* but the style is evident although short." If we must delimit these species to this extent the above treatment is not correct but it does not seem probable that it will ever be necessary or feasible to sort out *Sisymbrium* specimens, that agree in every other respect, by this method. The style is usually so minute that the question as to whether it is obsolete or evident is of little moment, especially since its relative development seems quite impossible of correlation with the more constant and certainly more striking differences indicated in the preceding paragraph.

Both *S. canescens* and *S. brachycarpon* undergo various modifications when they reach the prairie states and the Rocky Mountains. Without any attempt to clear up the almost inconceivable confusion that involves the numerous segregate species proposed in the West, one or two facts appear reasonably evident and therefore are presented now.

S. brachycarpon, particularly in the central-southern Rocky Mountains tends to have on the lower part of the stem a fine stellate puberulence which persists even after the plant has matured fruit. This variation forms part of *Sophia intermedia* Rydb., some specimens having this character being labeled by Dr. Rydberg as belonging to his species. However, *S. intermedia*, as originally described, included Montana specimens quite referable to *S. brachycarpon* and entirely i. separable from typical collections of that species from the northeastern states. The more southern permanently puberulent material, included in the former species by its author, connects the latter species with *S. canescens* on account of its more marked pubescence. Its leaves, however, definitely ally it to *S. brachycarpon*. By placing a limited interpretation on *S. intermedia* Rydb., letting it include only those plants with the more permanent pubescence, it is possible to dispose of a considerable number of collections from the Rocky Mountains that otherwise would have to be referred to *S. brachycarpon* or to *S. canescens* where they would be, in either case, decided misfits. I think, however, that the facts will be more clearly indicated if this plant is regarded as a variety of its nearer relative rather than as a species equally distinct from both.

There is another variation which, unless treated as a species, has been kept as a variety of a plant which is obviously not its nearest relative. This is *S. incisum* Engelm. var. *filipes* Gray, which has the comparatively short clavate pods with the seeds more or less in two rows as in the *S. canescens* group, as pointed out by Dr. Rydberg, Fl. of Col. 157 and Mem. N. Y. Bot. Gard. i. 185. In foliage it is not unlike *S. brachycarpon* except the upper leaf-segments tend to become elongate. The stems are glabrous or slightly cinereous with a minute stellate puberulence. It must, therefore, be regarded as a variety of *S. brachycarpon* rather than of *S. incisum*, a species well marked by its very narrow pods with strictly uniserial seeds.

The plants here discussed may be summarized as follows.

Pods very slender; seeds strictly 1-ranked in each cell....1. *S. incisum*.
Pods clavate or subclavate; seeds more or less 2-ranked in each cell.
  Plant canescent with a soft stellate- or branched-pubescence; pinnules short and rounded.....2. *S. canescens*.
  Plant green or cinereous below with a fine stellate puberulence; pinnules, at least mostly, elongate and slender.
    Leaf-segments of about uniform length; fruiting pedicels usually less than 1.5 cm. long.
      Glabrate or stellate-puberulent below when young; more or less glandular with simple viscid trichomes toward or quite to the base of the stem.....3. *S. brachycarpon*.

Stellate-puberulent below, rarely throughout, even in age; not glandular toward the base.....3a. var. *intermedium*.
Terminal, and sometimes upper-lateral, leaf-segments much longer than the others and mostly entire; fruiting pedicels often more than 1.5 cm. long.....3b. var. *filipes*.

1. SISYMBRIUM INCISUM Engelm. ex Gray, Pl. Fendl. 8 (1849). Not so common as is generally supposed, a large number of specimens so referred belonging to *S. Sophia* or even to the *S. canescens* group.

2. SISYMBRIUM CANESCENS Nutt. Gen. ii. 68 (1818). *S. pinnatum* Walt.) Greene, Bull. Calif. Acad. Sci. ii. 390 (1887), not *S. pinnatum* Barneoud ex C. Gay, Fl. Chile, i. 125. (1845). Specimens examined. SOUTH CAROLINA: in sand, Isle of Palms, Harbor of Charleston, May 2, 1912, *B. L. Robinson* (122). GEORGIA: St. Mary's, Feb. 1873, *C. E. Faxon*. FLORIDA: sandy seashore, Hillsborough Co., March 5, 1905, *A. Fredholm* (6504); weed in cultivated ground, Duval Co., March 20, 1912, *A. Fredholm* (5001); east Florida, *D. C. Eaton;* South Jacksonville, April 8, 1897, *J. R. Churchill;* cultivated ground near Jacksonville, March 22, 1898, *A. H. Curtiss* (6352). OKLAHOMA: sand, Ingersoll, May 6, 1902, *B. F. Bush* (1506). TEXAS: along Corpus Christi Bay, March 21, 1894, *A. A. Heller* (1470); sand, Columbia, March 27, 1900, *B. F. Bush* (450); Limpia Canyon, April 25, 1902, *Tracy & Earle* (244). NEW MEXICO: 1847, *A. Fendler* (32). ARIZONA: Tuscon, Feb. 27, 1907, *F. E. Lloyd*. CALIFORNIA: Antelope Valley, Sept.-Oct. 1878, *J. C. Phillips & C. S. Sargent;* Panamint Mts., Inyo Co., March 30, 1891, *Coville & Funston* (512). WASHINGTON: 1889, *G. R. Vasey* (180).

3. SISYMBRIUM BRACHYCARPON Richards. Frankl. 1st Journ. Appendix Ed. 1. 744 (1823). *S. canescens* Nutt. var. *brachycarpon* (Richards) Wats. Bibl. Index N. A. Bot. 69 (1878); *Sophia intermedia* Rydb. Mem. N. Y. Bot. Gard. i. 184 (1900) in part (see discussion above). Specimens examined. QUEBEC: sandy border of salt-marsh near mouth of River Ste. Anne Des Monts, Aug. 3–17, 1905, *J. F. Collins & M. L. Fernald*. MAINE: N. Berwick, May 29, 1902, *J. C. Parlin* (1462). VERMONT: rocky soil, Hog Back Island, Lake Champlain, July 22, 1900, *Nellie F. Flynn*. NEW YORK: cliffs along Lake Champlain, Port Henry, June 13, 1882, *Ezra Brainerd;* Garden Island, Lake Champlain, Aug. 1892, *Ezra Brainerd;* cliffs of Lake Champlain, near Westport, May 6–June 13, 1878, *C. G. Pringle;* Crown Point, May 28, Aug. 12, 1901, *W. W. Eggleston* (2552). ONTARIO: Kingston, June 9, 1902, *J. Fowler;* sand, Pelee Point, Lake Erie, May 27, 1901, *John Macoun* (33, 857). OHIO: Sandusky, May 31, 1903, *W. A. Kellerman*, TENNESSEE: rich bluffs, Knoxville, May 15, 1896, *Albert Ruth* (346). MICHIGAN: shore of Thunder Bay Island, June 18, 1895, *C. F. Wheeler;* Presque Isle, *Houghton;* Belle Isle in Detroit River, June 1898–1900, *O. A. Farwell*. WISCONSIN: Benderville, Brown Co., June 9, 1901, *J. H. Vehnette*. ILLINOIS: dry prairies, Decatur, May 4, 1897, *H. Allan Gleason* (254); Leithon, Lake Co., July 1, 1907, *F. C. Gates* (1717.4);

dry sandy soil, Peoria, June 1904, *F. E. McDonald;* dry clay soil, Mahomet, May, 1901, *H. Allan Gleason* (2379). MINNESOTA: Fort Snelling, June 1, 1891, *Edgar A. Mearns.* IOWA: Armstrong, May 26, 1897, *K. I. Cratty.* MISSOURI: dry woods, Cockerell, May 21, 1912, *B. F. Bush* (6714); Monteer, May 16, 1901, *B. F. Bush* (490). ARKANSAS: sand, Miller Co., April 27, 1902, *B. F. Bush* (1444). NORTH DAKOTA: railroad banks, Leeds, May 24 & June 25, 1901, *Dr. J. Lunell.* KANSAS: sterile ground, Riley Co., 1896, *J. B. Norton* (615); Osborne City, May 19, 1894, *C. L. Shear* (32). OKLAHOMA: along river, Muskogee, April 7, 1908, *Ezra Brainerd.* TEXAS: Dallas Co., April 3, 1901, *J. Reverchon* (2729). ASSINIBOIA: Crane Lake, June 20, 1894, *John Macoun* (3086); Milk River, July 13, 1895, *John Macoun* (10,333). MONTANA: Spanish Creek, May 8, 1901, *J. Vogel;* Bridger Mts., June 11, 1897, *Rydberg & Bessey* (4200); Bozeman, May 20, 1901, *W. W. Jones.* WYOMING: dry soil, Leucite Hills, June 17, 1901, *Merrill & Wilcox* (700). COLORADO: Mancos, June 24, 1898, *Baker, Earle & Tracy* (86); Cimarron, June 7, 1901, *C. F. Baker* (64). OREGON: near Grizzly Butte Camp, June 19, 1894, *J. B. Leiberg* (301). WASHINGTON: Yakima Co., May, 1892, *L. F. Henderson* (2379); Waitsburg, April 28 & May 18, 1897, *R. M. Horner* (77).

3a. SISYMBRIUM BRACHYCARPON Richards. var. **intermedium** (Rydb.), n. comb. *Sophia intermedia* Rydb. Mem. N. Y. Bot. Gard. i. 184 (1900) in part (see above discussion). Specimens examined. IDAHO: dry slopes, Hot Hole, East Fork Bruneau, Owyhee Co., July 3, 1912, *Nelson & Macbride,* (1888). WYOMING: Marquette, Aug. 4, 1893, *J. N. Rose* (117); waste ground, Bates Creek, Natrona Co., July 4, 1901, *Leslie N. Goodding* (195) (TYPE); U. S. Penitentiary Reservation, June 16, 1894, *Aven Nelson* (247). COLORADO: dry valley lands, Paradox, Montrose Co., June 17, 1912, *E. P. Walker* (100); Salida, June 19, 1898, *Baker, Earle & Tracy* (16). NEVADA: Carson City, Ormsby Co., June 3, 1902, *C. F. Baker* (970); among the Creosote bushes, Cane Springs, April 6, 1905, *Leslie N. Goodding* (2159); sandy draws, Meadow Valley Wash, April 7, 1905, *Leslie N. Goodding* (2167); Calientes, May 23, 1902, *Leslie N. Goodding* (926).

3b. SISYMBRIUM BRACHYCARPON Richards. var. **filipes** (Gray), n. comb. *Sisymbrium incisum* Engelm., var. *filipes* Gray Pl. Fendl. 8. (1849). Specimens examined. SASKATCHEWAN: Touchwood Hills, July 16, 1906, *Macoun & Herriot* (70, 174). IDAHO: dry sagebrush slopes, Twin Falls Co., June 25, 1912, *Nelson & Macbride* (1704). MONTANA: near Pony, July 6, 1897, *Rydberg & Bessey* (4197). WYOMING: Red Desert, Sweetwater Co., June 1, 1897, *Aven Nelson* (3078). NEVADA: Washoe Co., Hunter Creek Canyon, May 24, 1912, *A. A. Heller* (10401). OREGON: Clear Water, *Rev. Spalding* (TYPE). WASHINGTON: Wawawai, May 13, 1893, *C. V. Piper* (1477).

GRAY HERBARIUM.

A Correction concerning Sagittaria teres Watson and Potamogeton lucens L.— Dr. J. C. Phillips published recently (Auk xxviii. 188–200, April, 1911) an article entitled, "Ten years of observation on the migration of Anatidae at Wenham Lake, Massachusetts." Wenham Lake lies about fifteen miles north of Boston. On page 188, among other pond weeds mentioned as "common to the lake, very kindly identified for me by Mr. W. L. McAtee of the U. S. Biological Survey" are *Sagittaria teres* and *Potamogeton lucens*. As *S. teres* Watson has been recorded but once north of Cape Cod (Rhodora xii. 4, 1910), I wrote to Mr. McAtee, and he very generously sent me all the Wenham Lake specimens of the various species recorded in Dr. Phillips's article to examine and to keep.

The plant identified as *Sagittaria teres* proves to be the common *Eleocharis acicularis* (L.) R. & S., a form with the submersed capillary culms from 8 to 12 centimeters in length.

His *Potamogeton lucens* is *P. amplifolius* Tuckerm., a species frequent in the northern half of the Boston District (Rhodora xi. 206, 1909). *P. lucens* L. does occur at Wenham Lake and I have a specimen in my herbarium collected there by J. W. Robbins, no date, but it is a rare plant near Boston (Rhodora xi. 207, 1909), and has not been collected, so far as I know, for a good many years.

Mr. McAtee has very courteously urged me to write this note.— Walter Deane, Cambridge, Massachusetts.

A White-Flowered Spiraea tomentosa.— Professional systematists are, perhaps, too often inclined to ignore color-variation. On the other hand, there is probably no other vegetative phenomenon that plays a larger part in inciting and maintaining the interest of the local flower lover or amateur botanist. No one among us can fail to admit having experienced a certain thrill of delight over the first white Fireweed we chanced upon. However superficial color variation of this kind may be, the fact must remain that nature furnishes few changes that are more striking to the eye or that leave a deeper impression on the mind. How often has the discovery of a favorite plant with petals clothed in an unfamiliar hue added just the needed touch of excitement to a day a-field!

Treated subjectively rather than objectively, then, this kind of

variation is surely often worthy a name, especially when a series of collections indicate that it is not uncommon. Such seems to be the case with a white-flowered *Spiraea tomentosa*, which, although its existence was noted at least as long ago as 1862, as shown by a specimen in the Gray Herbarium, has more recently been brought to notice by some excellent specimens communicated by Miss E. F. Fletcher of Westford, Massachusetts. Besides several collections at hand that indicate its range, there is the following reference in a list of "Further Additions to the Flora of Middlesex County, Mass.," published in RHODORA, i. 223 (1899) by Alfred W. Hosmer. "*Spiraea tomentosa* L. White-flowered form, found in Carlisle."

Accordingly, I am proposing for this white-flowered form the name

SPIRAEA TOMENTOSA L. f. **albiflora**, f. n., corolla alba.—Specimens examined. MASSACHUSETTS: Forge Village, Prescott Meadow, Westford, July 19, 1914, *Miss E. F. Fletcher* (TYPE); Sherborn, Aug. 3, 1909, *Miss M. L. Loomis;* Hawley, July, 1906, *W. P. Brooks;* Williamstown, 1862, *Prof. Chadbourne.* NEW HAMPSHIRE: dry hillside, Alstead, July 30, 1899, *M. L. Fernald* (162); Alstead, July 28, 1901, *E. F. Williams;* Lower Baker Pond, Wentworth, Aug. 1, 1908, *E. F. Williams.*— J. FRANCIS MACBRIDE, Gray Herbarium.

BOTRYCHIUM LANCEOLATUM IN THE YELLOWSTONE.— Professor Fernald in his recent article in RHODORA on *Botrychium angustisegmentum*, when speaking of the occurrence of *Botrychium lanceolatum* in the West, gives the distribution of this latter species as extending from the Aleutian Islands to Mt. Ranier in Washington and the Selkirks in British Columbia. South and east of these mountain stations he says its occurrence is doubtful. In this connection I should like to note that I collected this plant on August 17, 1914, in the Yellowstone National Park, Wyoming, growing in the woods along the edge of the Yellowstone River near Yellowstone Lake.— F. W. HUNNEWELL, 2d, Wellesley.

THE FIELD MEETING OF THE VERMONT BOTANICAL AND BIRD CLUBS will be held at St. Johnsbury, July 6–10, 1915, under the auspices of the Fairbanks Museum of Natural History. Excursions will be made to an extensive tamarack swamp, to some cool bogs and

cedar swamps at Danville, to the "Nine Island Region" at Barnet, to Saddleback Mountain, Lunenburg, and Twenty-Mile Fall in the Connecticut at Waterford. A cordial invitation is extended to all members of the clubs included in the New England Federation of Natural History Societies. For details of trips, lodging places, rates, &c., address any of the following Committee.

ALICE W. WILCOX, St. Johnsbury, Vt.
INEZ A. HOWE, St. Johnsbury, Vt.
MABEL A. SHIELDS, St. Johnsbury, Vt.
W. E. BALCH, Lunenburg, Vt.

THE TWENTIETH ANNIVERSARY OF THE NEW YORK BOTANICAL GARDEN will be commemorated at the Garden during the week commencing September 6, 1915. Botanists from all parts of North America are invited to attend. A highly attractive programme is announced, including addresses, scientific papers, opportunities for the inspection of the grounds and buildings, also excursions to examine characteristic parts of coastal vegetation of Staten Island, pine barrens of New Jersey, etc., under the guidance of the Torrey Botanical Club.

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PLANTS AND PLANT SOCIETIES AT ROQUE BLUFFS, MAINE.

Clarence H. Knowlton.

About 40 miles east of Mt. Desert, and the same distance southwest of Eastport lies the town of Roque Bluffs, Washington county, Maine. Machias Bay lies just east, and Cutler, across the bay, is sixteen miles to the eastward. The body of water just south is called Englishman's Bay, and receives the waters of Englishman's River, a tidal estuary with tributary brooks, named for the first settler. The waters offshore are very cold, from the Greenland current, and fogs are frequent and dense in summer. This gives the coast a boreal climate, although it lies just south of North Latitude 45°.

The underlying rock is a silicious slate, cut by numerous dikes of diabase, many of which have been eroded by the sea, making deep sea-caves among the cliffs. West of the slate there is a large area of a fine-grained reddish granite, which forms the "red rocks" as the cliffs are locally called. This mass, too, has numerous diabase dikes. Except for these dikes, the rock is silicious and there is little lime to affect the soil and flora. Over the bedrock lies a thick layer of till containing many boulders, mostly of granite, coarse and fine. Over this in many level places lie beds of marine clay.

Between two of the rocky points the waves and the 16-foot tide have thrown up a half-mile of barrier beach, so wide that the inner half of it is under cultivation, and the pond behind it is of water entirely fresh. Besides the Englishman's River there is a smaller unnamed estuary, and the salt marshes border these. The rest of the shore is rocky and in many places precipitous.

For several years I have spent a week or more of my summer vacation in this interesting place. To insure a complete survey of the flora there should be, of course, spring and fall visits as well, but the season there is so short that the plants often overlap. Thus I have seen *Ledum* in bloom on July 4, wild roses on Sept. 3, and *Cornus canadensis* in flower and in fruit in the last week of July. The following lists are therefore reasonably complete.

For convenience in presentation, and to show the natural plant societies of the region, I have selected the eight natural habitats — sea beach, salt-marsh, rocky headlands, peat-bogs, barrier beach pond, swamps, Canadian forest and cleared upland. The swamps and cleared upland are less primitive than the other six groups, and new plants seem to be working into these areas from the warmer region back of the coast.

For completeness the fields should be added, but their flora is largely of outside origin. Four introduced weeds, however, deserve special mention. *Matricaria suaveolens* is the commonest of dooryard and roadside weeds, completely covering the ground in places, and giving forth its pineapple-like odor when crushed. *Rumex Patientia* is the early broad-leaved dock and abounds in many parts of the county. The prevailing *Leontodon* is a large plant 4–5 dm. in height and full of good-sized heads all through July. This plant is pubescent and the involucres are densely covered with hairs. This is quite different from the smooth slender plant which is in bud at the same time, which is the type, while this larger plant is *L. autumnalis*, var. *pratensis*. Another unusual plant, *Arrhenatherum elatius*, has been introduced in grass seed in one place only, but has flourished there for several years.

Sea beach, sand or gravel.

Agropyron repens
Ammophila arundinacea
Elymus arenarius
Hierochloe odorata
Spartina Michauxiana
Polygonum aviculare, var. *vegetum*
Rumex pallidus
Atriplex patula, var. *hastata*
Suaeda maritima
Arenaria peploides L.
var. *robusta* Fernald
Cakile edentula
Rosa virginiana
Lathyrus maritimus
Oenothera muricata
Coelopleurum actaeifolium
Convolvulus sepium, var. *pubescens*
Mertensia maritima
Galium Aparine

Of the above plants it is interesting to note the comparative abundance of *Elymus arenarius* on gravelly beaches. This circumboreal plant is now known along the coast to Casco Bay, the Isles of Shoals and Provincetown. *Rosa virginiana* deserves mention from its great abundance, its variability and the remarkable size and beauty of its flowers and glossy green leaves. *Oenothera muricata* is a very handsome species here. The buds are massed at the top of the stem, appearing cymose, and often ten or a dozen will open at once, forming a ring of flowers. *Mertensia maritima* is a peculiar prostrate plant, with glaucous blue-green leaves, red buds, and blue flowers. It is occasional, but never abundant, on gravelly beaches. *Galium Aparine* occurs in only two places, in loose shingle above high tide, and it has evidently been brought in ballast from further south.

Salt Marsh.

Zostera marina
Triglochin maritima
Agropyron repens
Agropyron caninum (L.) Beauv.,
var. *tenerum* (Vasey) Pease & Moore
Agrostis alba
Festuca rubra
Hierochloe odorata
Hordeum jubatum
Puccinellia angustata
Spartina glabra, var. *alterniflora*
" *patens*
Carex maritima
Scirpus americanus
Juncus balticus, var. *littoralis*
" *bufonius*
Juncus bufonius, var. *halophilus*
" *Gerardi*
Atriplex patula, var. *hastata*
Suaeda maritima
Salicornia europaea
Polygonum Fowleri
Stellaria humifusa
Spergularia canadensis
Ranunculus Cymbalaria
Potentilla pacifica
Limonium carolinianum
Glaux maritima, var. *obtusifolia*
Plantago decipiens
Aster novi-belgii, var. *litoreus*
Solidago sempervirens

In the salt-marshes *Carex maritima* covers large areas so densely that other species are few. The past season, however, after diligent search I found good specimens of the northern *Stellaria humifusa*, prostrate in the tidal mud between the stalks of the *Carex* in one of these areas. *Juncus balticus*, var. *littoralis* is the only salt-marsh species which seems able to compete successfully with other species in other habitats. It is frequent in swampy places some distance from the sea, and at one place I have found it in the shade of spruce trees at the edge of a peat-bog.

Rocky Headlands.

Picea rubra
Juniperus horizontalis
Alnus mollis
Deschampsia flexuosa
Festuca rubra
Iris setosa, var. *canadensis*
Arenaria lateriflora
Sagina procumbens
Potentilla tridentata
Rosa virginiana
Vicia angustifolia, var. *segetalis*
Empetrum nigrum
Ligusticum scothicum
Vaccinium Vitis-Idaea, var. *minus*
Convolvulus sepium, var. *pubescens*
Euphrasia americana
" *Randii*
Rhinanthus Crista-galli L., var. *fallax*
Plantago decipiens
Campanula rotundifolia
Senecio sylvaticus
Solidago Randii

Roque Bluffs is near the southern limit of *Iris setosa*, var. *canadensis* at Little Duck Island. This is frequent on the headlands within reach of the sea-spray, but it does not grow in the salt-marshes. *Empetrum nigrum* is a sprawling undershrub on many of the sea-cliffs, and is different in habit and size from the same plant growing in the sphagnum of peat-bogs. *Euphrasia Randii* I have found in only one place, close to a large diabase dike, but at Machiasport it grows over quartzite, so there is apparently no lithological reason for its scarcity. *Senecio sylvaticus* is a slender annual, occasional in crevices, but never abundant.

Peat-bogs.[1]

Larix laricina
Picea mariana
Betula alba, var. *cordifolia*
Nemopanthus mucronata
Chamaedaphne calyculata
Andromeda glaucophylla
Gaylussacia baccata
" *dumosa* (Andr.) T. & G. var. *Bigeloviana* Fernald
Kalmia angustifolia
" *polifolia*
Ledum groenlandicum
Rhododendron canadense
Vaccinium macrocarpon
" *Oxycoccus*
Scheuchzeria palustris
Carex canescens, var. *disjuncta*
" *leptalea*
" *limosa*
" *oligosperma*
" *pauciflora*
" *paupercula*, var. *irrigua*
" *sterilis*
" *trisperma*
" *trisperma*, var. *Billingsii*
Rynchospora alba

[1] In this and the following plant societies I have placed trees and shrubs before the herbaceous plants, as a slight aid to visualizing the groups.

Eriophorum callitrix
" *tenellum*
" *angustifolium*
" *virginicum*
Smilacina trifolia
Arethusa bulbosa
Calopogon pulchellus
Pogonia ophioglossoides
Microstylis unifolia
Comandra livida
Drosera longifolia
" *rotundifolia*
Rubus Chamaemorus
Empetrum nigrum
Menyanthes trifoliata
Melampyrum lineare
Aster nemoralis, var. *Blakei*
Solidago uniligulata

The peat-bogs are one of the most striking features of the landscape. They are level, or a bit higher in the middle, with stunted trees of *Picea mariana* to add dreariness to the view. Around the edges they are very wet, and some of the bogs quake as you walk in the wet sphagnum. In others the central part is firm and even dry.

The Labrador tea, *Ledum groenlandicum*, is abundant, and has beautiful white flowers in June. One bog is full of staminate *Rubus Chamaemorus*, another has both staminate and pistillate plants, mostly the latter. It is a curious sight to see this plant well fruited, for the berries are a very rich golden yellow, and lie on the beds of sphagnum like so many gold coins. *Gaylussacia dumosa*, var. *Bigeloviana* I have found in only one bog so far, with the moss up nearly to the tuft of leaves at the tip. It is in full bloom in late July, a most attractive cream-white bell-flower. *Scheuchzeria* grows in the peat-bog by the barrier-beach pond, as the other bogs do not seem wet enough for it. *Carex limosa* grows with it, and also flourishes under swamp conditions across the pond. *Carex trisperma*, var. *Billingsii* flourishes in the same place, while the other sedges listed are of more general distribution. *Comandra livida* grows in only one bog, and does not flower or fruit. An examination of several extensive root-systems indicates that this species is not parasitic here. It was new to eastern Maine when I found it in 1907, but it has since been found by Prof. M. L. Fernald at West Quoddy Head. Another tenuous little bog plant is *Melampyrum lineare*, which has linear leaves and is much more delicate than the woodland form of the same species.

The peat-bog flora contains a large number of boreal plants, because these cold wet masses of sphagnum are so much like the bogs northward under the Arctic Circle. Among these boreal plants are *Scheuchzeria*, *Carex limosa*, *C. pauciflora*, *Eriophorum angustifolium*, *Comandra livida* and *Rubus Chamaemorus*. Along with them are many other bog plants whose range is from Newfoundland to Georgia or Florida.

Such are *Carex sterilis*, *Arethusa*, *Pogonia* and *Drosera longifolia*. On the whole, however, the peat-bogs are much more distinctly boreal in character than any of the other plant societies at this place. Many of the species also flourish on the granitic mountain-tops of northern New England.

Barrier-Beach Pond.

Typha latifolia
Sparganium fluctuans
Potamogeton alpinus
" *epihydrus*
" *natans*
Carex filiformis
" *rostrata*, var. *utriculata*
Dulichium arundinaceum
Eleocharis palustris
" *palustris*, var. *vigens*
Scirpus validus
Nymphaea advena, var. *variegata*
Potentilla palustris (L.) Scop.,
var. *villosa* (Pers.) Lehm.
Sium cicutaefolium
Menyanthes trifoliata

The most vigorous of these fresh-water plants is *Menyanthes*, which occupies large areas of the shallow water, and works inland to some extent in peat-bog and swamp. The *Potentilla* is large and handsome, with big stalks, and long root-stocks.

Swamps and wet Fields.

Salix lucida
Myrica Gale
Alnus incana
Pyrus melanocarpa
Rosa virginiana
" *nitida*
Rubus hispidus
Spiraea latifolia
Ilex verticillata
Lonicera caerulea, var. *villosa*
Aspidium cristatum
" *Thelypteris*
Asplenium Filix-femina
Osmunda cinnamomea
" *Claytoniana*
Equisetum arvense
Agrostis alba
Bromus ciliatus
Calamagrostis canadensis
Glyceria borealis
Glyceria canadensis
" *grandis*
" *laxa*
" *nervata*
" *pallida*
" *Torreyana*
Carex conoidea
" *Crawfordii*
" *Crawfordii*, var. *vigens*
" *crinita*, var. *gynandra*
" *debilis*, var. *Rudgei*
" *filiformis*
" *hormathodes*
" *limosa*
" *Oederi*, var. *pumila*
" *pallescens*
" *rostrata*, var. *utriculata*
" *stellulata*
" *stellulata*, var. *angustata*
" *stellulata*, var. *cephalantha*

Carex scoparia
" *scoparia*, var. *condensa*
" *scoparia*, var. *moniliformis*
Cladium mariscoides
Dulichium arundinaceum
Eleocharis acicularis
" *palustris*
" *tenuis*
Eriophorum angustifolium
Rynchospora alba
Scirpus atrocinctus
" *georgianus*
" *rubrotinctus*
" *rubrotinctus*, var. *confertus*
Juncus balticus, var. *littoralis*
" *brevicaudatus*
" *bufonius*
" *effusus*, var. *Pylaei*
" *filiformis*
" *tenuis*
Iris versicolor
Habenaria clavellata
Polygonum sagittatum
Rumex Brittanica
" *Patientia*
Arenaria lateriflora
Stellaria borealis
" *graminea*
Ranunculus pennsylvanicus
Thalictrum polygamum
Thalictrum polygamum var. *hebecarpum*
Impatiens biflora
Hypericum canadense
" *ellipticum*
" *virginicum*
Viola cucullata
" *incognita*
" *lanceolata*
" *pallens*
" *primulifolia*
Epilobium adenocaulon
" *densum*
Conioselinum chinense
Heracleum lanatum
Hydrocotyle americana
Lysimachia terrestris
Convolvulus sepium
Cuscuta Gronovii
Lycopus uniflorus
Scutellaria galericulata
Chelone glabra
Galium Claytoni
" *trifidum*
Aster Radula
Eupatorium perfoliatum
" *purpureum*, var. *maculatum*
Solidago graminifolia

Most of these plants are not uncommon in our range, and this habitat is less boreal than several of the others. There are probably other plants in this group which further search would reveal. Of the sedges *Carex Oederi*, var. *pumila* is very common in wet pastures and by roadsides, both in clay and muck. *Viola incognita* is the common white violet of swamps and woods. *Conioselinum* is rare enough to please the botanist decidedly, when he discovers its bright green dissected leaves and white umbels of flowers. *Heracleum* is at only one station near the coast, but flourishes inland.

Canadian Forest.

Abies balsamea
Larix laricina
Picea canadensis
" *rubra*
Thuya occidentalis
Populus tremuloides
Betula alba, var. *cordifolia*
" " var. *papyrifera*
Taxus canadensis
Salix balsamifera
" *discolor*
" *discolor*, var. *eriocephala*
" *humilis*
" *rostrata*
Alnus incana
" *mollis*
Ribes oxyacanthoides
" *prostratum*
Amelanchier laevis Wiegand
Prunus pennsylvanica
Pyrus americana
" *arbutifolia*, var. *atropurpurea*
" *sitchensis*
Rubus nigricans
" *tardatus*
Ilex verticillata
Nemopanthus mucronata
Diervilla Lonicera
Lonicera canadensis
Sambucus racemosa
Viburnum cassinoides
" *Lentago*
Aspidium noveboracense
" *spinulosum*,
var. *dilatatum*
var. *intermedium*
Asplenium Filix-foemina
Phegopteris polypodioides
Polypodium vulgare
Equisetum sylvaticum
Lycopodium annotinum
" *clavatum*
" *lucidulum*
Lycopodium obscurum,
var. *dendroideum*
Carex brunnescens
" *communis*
" *crinita*
" *crinita*, var. *gynandra*
" *novae-angliae*
" *trisperma*
Luzula saltuensis
Maianthemum canadense
Streptopus roseus
Trillium undulatum
Cypripedium acaule
Habenaria obtusata
Polygonum cilinode
Coptis trifolia
Dalibarda repens
Rubus triflorus
Oxalis Acetosella
Circaea alpina
Viola incognita
" *pallens*
Aralia hispida
" *nudicaulis*
Cornus canadensis
Chiogenes serpyllifolia
Gaultheria procumbens
Moneses uniflora
Monotropa uniflora
Pyrola americana
" *elliptica*
Trientalis americana
Melampyrum lineare
Veronica officinalis
Mitchella repens
Linnaea borealis, var. *americana*
Aster acuminatus
" *lateriflorus*, var. *hirsuticaulis*
" *puniceus*
" *radula*
Solidago macrophylla
" *rugosa*
Prenanthes trifoliolata

These woods are dark and mossy with frequent glades. The evergreens predominate, for the poplars are only casual. As for the birches, instead of having the dazzling white bark which often characterizes the paper birches, these trees have a dull reddish bark, and are not conspicuous in the forest. Such rich woods trees as the maples and yellow birch are rare near the shore, even in the undergrowth.

Salix balsamifera is an occasional shrub, with bright red young leaves at the tips of the branches. It does not give out its resinous perfume until it has wilted. *Amelanchier laevis* is the only species of the genus which I have so far been able to find. It is abundant and fruits heavily. *Pyrus sitchensis* is occasional close to the sea, but seems to be much less frequent than *P. americana*. In *Rubus* there is a good deal of a trailing species which seems to be *R. nigricans*, while there is another more erect species which always comes out *R. tardatus*, by the key in the seventh edition of Gray's Manual.

The most conspicuous fern is *Aspidium spinulosum*, var. *dilatatum*. It fills moist glades in the woods with great masses of delicate fronds four or five feet long, and often over a foot in width. *Solidago macrophylla*, so frequent in mountain woods inland, here flourishes near sea-level.

In general the flora of these Canadian woods is full and typical, except that the calciphiles are lacking.

Cleared Upland (Pastures, Old Fields and Roadsides).

Juniperus communis, var. *depressa*
Myrica asplenifolia
Alnus incana
Betula populifolia
Crataegus sp.
Rosa virginiana
Rubus canadensis
" *idaeus*, var. *aculeatissimus*
Spiraea latifolia
" *tomentosa*
Vaccinium canadense
" *pennsylvanicum*
" *pennsylvanicum*, var. *nigrum*
Diervilla Lonicera
Aspidium spinulosum
Dicksonia punctilobula
Pteris aquilina
Lycopodium clavatum
Agrostis alba, var. *vulgaris*
" *hyemalis*
Danthonia spicata
Panicum boreale
" *implicatum*
Poa pratensis
" *triflora*
Carex adusta
" *pallescens*
Juncus Greenei
Sisyrinchium angustifolium
Spiranthes Romanzoffiana
Polygonum cilinode

Corydalis sempervirens
Potentilla canadensis, var. *simplex*
" *monspeliensis*
" *tridentata*
Lechea intermedia
Oxalis corniculata
Viola incognita
" *labradorica*
" *primulifolia*
" *septentrionalis*
Epilobium angustifolium
Oenothera pumila
Aralia hispida
Cornus canadensis
Prunella vulgaris L.,
var. *lanceolata* (Barton) Fernald
Euphrasia americana
Houstonia caerulea
Achillaea Millefolium
Anaphalis margaritacea
Antennaria canadensis
Aster lateriflorus, var. *hirsuticaulis*
" *paniculatus*
Hieracium floribundum
" *aurantiacum*
Solidago rugosa

Several of these plants seem to be introductions from outside. Such are *Juniperus communis*, var. *depressa*, *Myrica asplenifolia*, *Betula populifolia* and perhaps the lone *Crataegus* tree.

Last summer I was much pleased to find in dry soil where brush had been burned, a very vigorous sedge which I soon found to be *Carex adusta*, a well-named species. This has been known in New England only from Mt. Desert, and is a northern plant, so it is interesting to secure this Washington County station for it. *Juncus Greenei* is here at its northeastern limit so far as known, its previous limit being Mt. Desert. *Lechea intermedia* is another dry land plant which is rather frequent. *Spiranthes Romanzoffiana* is an early bloomer, as I have found it in late July. *Viola labradorica* seems to be the least of all the violets. The plants are tiny, the leaves small, and the branches very slender, though short. I have found it in only one place.

There are several other very interesting plants which I have found in adjoining towns, and may at some time discover at Roque Bluffs. Thus at Libby Island, Machiasport, I have found *Sagina nodosa*, var. *glandulosa*, *Sedum roseum*, *Lathyrus palustris*, var. *pilosus*, *Epilobium adenocaulon*, var. *perplexans*, *Primula farinosa*, var. *macropoda*, and *Prenanthes nana*. At Point of Maine, Machiasport, are *Sedum roseum* and *Lathyrus palustris*, var. *pilosus*. At Roque Island, which lies a mile off shore in Englishman's Bay, but is a part of Jonesport, I have found *Sparganium angustifolium* and *Montia lamprosperma*, also a hardwood forest of beeches, ash, and hornbeam. At Machias, the next town inland, I have found *Scirpus pedicellatus*, *Streptopus amplexifolius*, *Listera cordata* and *Senecio Robbinsii*, all of which are to be expected in Roque Bluffs.

In addition to Rand and Redfield's excellent Flora of Mt. Desert there have been many RHODORA articles in regard to the flora of the Maine coast. The following list of these articles may be useful for reference.

CHAMBERLAIN, E. B. Meeting of the Josselyn Botanical Society, X. 172.

COLLINS, F. S. An Algologist's Vacation in Eastern Maine, IV. 174; The Marine Flora of Great Duck Island, II. 209.

COOK, M. P. Plants of the Island of Monhegan, III. 187.

CUSHMAN, J. A. *Primula farinosa*, var. *macropoda* on the Maine Coast, IX. 217; Some Interesting Maine Plants, XI. 12.

FERNALD, M. L. Notes from the Phaenogamic Herbarium of the N. E. Botanical Club,—II, XIII. 177.

FERNALD M. L., and WIEGAND, K. M. Botanizing in Eastern Maine, XII. 101, 133.

GRAVES, A. H. Woody Plants of Brooklin, Maine, XII. 173.

HILL, A. F. Notes on the Flora of the Penobscot Bay Region, Maine, XVI. 189.

KENNEDY, G. G. The Maine Coast at Cutler, IV. 23.

KNOWLTON, C. H. Plants collected at Roque Bluffs, Maine, in 1907, IX. 218.

MOULTON, D. H. Annual Meeting of the Josselyn Society, IV. 188.

NORTON, A. H. Plants from the Islands and Coast of Maine, XV. 137.

RAND, E. L. *Pinus Banksiana* on Mt. Desert Island, I. 135; *Subularia* on Mt. Desert, Island I. 155; Plants from the Duck Islands, II. 207; Additions to the Plants of Mt. Desert Island, X. 145.

SHAW, E. L. A New Station for *Iris Hookeri* in Maine, X. 145.

HINGHAM, MASSACHUSETTS.

THE VARIETIES OF CARDAMINE OLIGOSPERMA.

G. S. Torrey.

In a package of plants recently sent to the Gray Herbarium by Mr. W. N. Suksdorf of Bingen, Washington, were included several forms of *Cardamine* allied to *C. oligosperma* Nutt., which he had been unable to place to his satisfaction with the aid of the literature at his command. His keen observations and painstaking notes leave little, however, for the herbarium worker to do. Quotations from Mr. Suksdorf's notes will make the situation clear.

"1816, 7487, 7453 seem to be the common form west of the Cascade Mts., and up the Columbia some distance in the mountains; I have not found it east of the mountains. I distributed this form as *C. oligosperma?*, having before distributed the next one as true *C. oligosperma.* The stem is strict, not often branched, has 4 or more leaves and a very short raceme; young pods hairy; seed mostly rather long.

"7452, 7457 are certainly distinct from *C. oligosperma,* and I think they represent an undescribed species. It is not so strictly erect, less pubescent or nearly glabrous; stems often scape-like or leafless, or with a few branches, mostly large ones if from the base; raceme very much longer; pods mostly narrow, not pubescent, and the pedicels longer; seeds nearly orbicular.

"7451. There can scarcely be any doubt that this *Cardamine* is an undescribed species. I have found it only at one small place, much less than a square rod in size; but I have not looked for it, and so may find it at other places later. It certainly cannot be a form of any one of the above species. Its leaves have fewer leaflets, those of the stem having only 3 or 5; it is glabrous throughout or very nearly so; branches, if any, mostly leafless; pods rather short on short pedicels; but the most important fact seems to be that the flowers come from the axils of conspicuous bracts, especially the lower ones. These bracts are not found everywhere, but I think I have not seen a raceme without any bracts."

It appears, then, that we have three plants all closely related to *C. oligosperma:* a form with a bracted inflorescence; and two bractless forms, one with glabrous, the other with hairy pods. To this series may be added the plant described by Rydberg as *Cardamine unijuga,*

the leaves of which have only 3 leaflets,— doubtless merely a leaf variant.

Turning to O. E. Schulz's recent Monographie der Gattung Cardamine,[1] we find that all these forms have been recognized; but unfortunately the fact that Schulz was unfamiliar with the type of Nuttall's *Cardamine oligosperma*, and that his conception of the relations of the various subspecific categories was not altogether in accord with those since set forth in the International Rules, necessitate the following changes.

CARDAMINE OLIGOSPERMA Nutt. in T. & G. Fl. N. Am. i. 85 (1838–40). *C. hirsuta*, subsp. *oligocarpa*, proles *lasiocarpa* O. E. Schulz. Engl. Bot. Jahrb. xxxii. 470 (1903). Nuttall's type, from "Oregon woods," preserved in the Gray Herbarium, bears immature fruit, and has the stems, petioles, leaflets, and pods beset with short stoutish spreading hairs; and the inflorescence bractless. This, the typical form of the species, is confined to Washington and Oregon.— WASHINGTON: wild in garden, Bingen, Klickitat Co., *Suksdorf*, no. 7453; wet places in forest at Prindle, Skaminia Co., *Suksdorf*, no. 7487; bottom lands near mouth of Lake River, Clarke Co., *Suksdorf*, no. 2301. OREGON: Oregon woods, *Nuttall;* wet places in dense forest at Linnton near Portland, *Suksdorf*, no. 1816; Sauvie's Island, 1882, *Howell*.

var. **lucens**, var. nov., siliculis glabris, pilis caulis saltem super foliis carentibus. Pods glabrous, hairs of the stem absent, at least above the leaves.— *C. oligosperma* Am. auth. in part. *C. hirsuta* subsp. *oligosperma* O. E. Schulz, l. c., 468.— This smooth variety is much more abundant than the species, extending south to California. The following representative specimens may be cited.— WASHINGTON: damp places, common at Bingen, Klickitat Co., *Suksdorf*, no. 7452 (TYPE in Hb. Gray.); shady rocky stream-banks, Waitsburg, *Horner*, no. R79B64. OREGON: Chenowith Creek, Wasco Co., Oregon, *Sheldon*, no. 10,200; bogs near Portland, 1884, *L. F. Henderson*. CALIFORNIA: Mt. Diablo, 1878, *Lemmon;* foothills near Stanford University, Santa Clara Co., Baker, no. 517; back of Alum Rock Park, Santa Clara Co., *Heller*, no. 8484; common in moist shady ground, vicinity of Eureka, Humboldt Co., *Tracy*, no. 1009.

var. **bracteata** (O. E. Schulz), n. comb. *C. hirsuta*, subsp. *oligosperma*, var. *bracteata* O. E. Schulz, l. c., p. 470. This plant, which resembles var. *lucens* in its lack of pubescence, but differs from that and from the species in having narrow simple or trifid bracts at the base of the inflorescence or throughout, is known only from two collections of Mr. Suksdorf in Klickitat Co., Washington; viz., low wet places,

[1] Monographie der Gattung Cardamine, von O. E. Schulz., Engl., Bot. Jahrb. xxxii. 280–623 (1903).

Columbia River, 1885, no. 503; springy place over a cliff, Bingen, 9 & 15, April, 6 May, 1912, no. 7451.

var. **unijuga** (Rydb.), n. comb. *Cardamine unijuga* Rydb. Bull. Torr. Bot. Club, xxiv. 246 (1897). *C. hirsuta*, subsp. *oligosperma*, proles *unijuga* O. E. Schulz, l. c., 469.— MONTANA: Spanish Basin, Gallatin Co., July 18, 1896, *Flodman*, no. 494 (TYPE collection). WASHINGTON: wet ground, W. Klickitat Co., May 5, 1881, *Suksdorf*, no. 723. Rocky Mts., lat. 39°–41°, 1862, *Hall & Harbour*, no. 33 in part. California: damp grassy places in the cañon of Big Chico creek, Butte Co., March, 1914, *Heller*, no. 11,196. Plants of var. *lucens* collected at Paradise Creek, Mt. Rainier, Washington, Aug. 23, 1895, by *O. D. Allen* approach var. *unijuga*.

GRAY HERBARIUM.

A NEW CAREX FROM NEWFOUNDLAND.

M. L. FERNALD.

CAREX (FRIGIDAE) **misandroides**, n. sp., laxe caespitosa basi castanea; foliis lineari-involutis apice acicularibus minute serrulatisque; culmis 1–10 cm. altis gracilibus glabris; bracteis umbellae vaginantibus, basi stramineis vel brunneis, supra in laminam brevem subulato-linearem scabram productis; spicis femineis 1–4 plerumque arcuato-pedunculatis basilariis vel terminalibus plerumque umbellatis, ellipsoideis vel ovoideis 0.5–1.5 cm. longis interdum apice masculis; pedunculis valde inaequalibus 0.2–7 cm. longis; spicis masculis 1–2 plerumque 1–1.5 cm. longis, sessilibus vel pedunculatis, pedunculis usque 3.5 cm. longis; squamis femineis atropurpureis lucidis ovatis subacutis, masculis obovatis apice rotundatis plus minusve albido-hyalinisque; perigyniis squama longioribus oblongo-lanceolatis 5–6 mm. longis, 1.7 mm. latis compressis subacuminatis vix rostratis laevibus lucidis atropurpureis enervatis vel obscure nervatis, ore albicanti emarginato, margine integris vel obsolete serrulatis; stigmatibus 2, achaeniis plano-convexis anguste obovatis 1 mm. longis.

Loosely caespitose, the base castaneous: leaves linear-involute, acicular and minutely serrulate at tip: culms 1–10 cm. high, slender, glabrous: bracts of the umbel sheathing, stramineous or brown at base, produced above into a short subulate-linear scabrous lamina: pistillate spikes 1–4, mostly arcuate-peduncled, basal or terminal, mostly umbellate, ellipsoid or ovoid, 0.5–1.5 cm. long, sometimes staminate at apex; peduncles conspicuously unequal, 0.2–7 cm. long: staminate spikes 1 or 2, chiefly 1–1.5 cm. long, sessile or peduncled; the peduncles up to 3.5 cm. long: pistillate scales purple-black, shining,

ovate, subacute; staminate obovate, rounded and more or less white-hyaline at apex: perigynia longer than the scales, oblong-lanceolate, 5–6 mm. long, 1.7 mm. wide, compressed, subacuminate, scarcely beaked, smooth, shining, purplish-black, nerveless or obscurely nerved; the orifice whitish, emarginate; the margin entire or obsoletely serrulate: stigmas 2; achenes plano-convex, narrowly obovate, 1 mm. long.—NEWFOUNDLAND: mossy knolls on the limestone tableland, altitude 200–300 m., Table Mountain, Port à Port Bay, July 16 & 17, 1914, *Fernald & St. John*, no. 10,801 (TYPE in Gray Herb.).

Simulating *C. misandra* R. Br. of the Arctic, a species in which the terminal spike is staminate at base only, the scales and perigynia narrower, the latter prolonged into a slender distinctly serrate beak, the stigmas commonly 3, and the leaves broader and flat. Only one knoll of *C. misandroides* was observed during a hurried trip across the tableland of Table Mountain and the material collected shows scarcely any individuals which are clearly duplicates, so great is the diversity in length of the culms and peduncles. In one individual a tall culm (1 dm. high) bears an umbel with a nearly sessile staminate spike and 4 pistillate spikes on peduncles from 2 mm. to 3.5 cm. long; others have long slender peduncles arising from near the base of the plant, one of them bearing sessile staminate and pistillate spikes, and one extreme individual has the staminate spike essentially sessile at the base of the plant, with the long-peduncled pistillate spikes overtopping it.

On Table Mountain *C. misandroides* was associated with a choice group of arctic-alpine calciphiles, such as *Kobresia caricina* Willd., *Carex pedata* L., *Salix leiolepis* Fernald, *Anemone parviflora* Michx., *Potentilla nivea* L., *Dryas integrifolia* Vahl, *Hedysarum alpinum* L., *Antennaria eucosma* Fernald & Wiegand, *A. spathulata* Fernald and *Arnica chionopappa* Fernald.

GRAY HERBARIUM.

RANGE EXTENSIONS OF TWO GRASSES.—Among the numerous specimens that are constantly being sent to the Gray Herbarium for identification or verification, two have come to my notice that are worthy special note because representing an extension of range and a new introduction to the region covered by the last edition of Gray's Manual.

Panicum stipitatum Nash. We have two collections which greatly extend the range "New Jersey to Kentucky and southward," viz.: Ohio: near Standing Rock, Mahoning County, Aug. 19, 1910, *E. W. Vickers*. Communicated to the Gray Herbarium, March, 1915, by A. N. Rood of Phalanx, Ohio. Indiana: about five miles east of Norris on the Henryville road, Washington County, Aug. 16, 1912, *Chas. C. Deam* (12,090). The label bears the note, "First record for the state; determined by Agnes Chase."

Sporobolus asperifolius (Nees & Meyer) Thurb. Minnesota, low sandy roadside, near Windom, Cottonwood County, August 28, 1914, *J. C. Nelson*. This grass is very common throughout the west, ranging east to Nebraska, Kansas and the Dakotas. It is doubtless an introduction in Minnesota and, if once established, it will probably spread rapidly, if one may judge from its vigor in its native habitat.—J. Francis Macbride, Gray Herbarium.

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THE AMERICAN OSTRICH FERN.

M. L. Fernald.

The Ostrich Fern of eastern North America is commonly treated as identical with the Eurasian species; and, although long kept with *Onoclea* as *O. Struthiopteris* (L.) Hoffm., it is now recognized by the leading students of ferns as constituting, with a few other species, a distinct genus *Matteuccia* Todaro (1866). For a long time those who maintained the Ostrich Ferns as generically distinct from *Onoclea* placed them under *Struthiopteris* Willd. (1809) but the earlier valid use of the name *Struthiopteris* by Weiss in 1770 for the genus which has been generally called *Lomaria* Willd. (1809) necessitates the abandonment of the generic name *Struthiopteris* for our "Ostrich Ferns." The uniting of the American Ostrich Fern with the European under the names *Onoclea Struthiopteris* (L.) Hoffm., *Struthiopteris germanica* Willd. or *Matteuccia Struthiopteris* (L.) Todaro has of late been so general and so entirely unquestioned that one wonders whether European students of the ferns can have much familiarity with the American plants or American students with the European material.

By the older students of our flora the plants were not considered conspecific, while by some of a later generation they have been treated as varietally distinct. The first to distinguish the American plant was Michaux who, in 1803, described the American Ostrich Fern from material collected at Montreal as *Onoclea nodulosa:* "O. pinnis sessilibus, linearibus, pinnatifidis: fronde fertili pinnis quasi noduloso-articulatis; urceolis contiguis";[1] but most unfortunately Michaux appended to this very clear description the synonyms *Acrostichum*

[1] Michx. Fl. Bor. Am. ii. 272 (1803).

areolatum Linn. and *Osmunda caroliniana* Walt. and the "*Hab.* in Carolinae limosis umbrosis." The synonymy and locality belong, then, clearly to *Woodwardia areolata* (L.) Moore, the description and the type material to the Canadian *Matteuccia.* But in interpreting Michaux's species the important weight should naturally be given the description and the type-material rather than the cited synonyms and locality, which do not accord with the description or with the plant described, especially since the name of the plant described was not derived from either of the supposed synonyms. In 1809 Schkuhr [1] beautifully illustrated some of the differences between the American *Onoclea nodulosa* and the Old World *O. Struthiopteris*, and it has been customary to cite Schkuhr's *O. nodulosa* as different from that of Michaux which most students, following the synonymy rather than the description, have generally referred to *Woodwardia areolata;* but, as indicated above, Michaux's plant is identical with Schkuhr's. The fact that Michaux's type-material and the synonyms cited belonged to different plants was clearly recognized by Desvaux, who took up the Michaux plant as *Struthiopteris nodulosa*, based on "Onoclea nodulosa MICH., *Fl. Am. bor.*, 2, p. 272. *Excl. syn.* SCHK., *Fil.* t. 104." [2]

In 1810, Willdenow, recognizing in the American plant a species distinct from his European *Struthiopteris germanica*, called it *S. pensylvanica*,[3] and under this name the American plant was maintained as a distinct species by Nuttall, Torrey (in his *Compendium*), and other early discriminating students of our flora. Subsequently, however, the American and the European plants have been generally treated as identical, though in 1862 Lowe treated the American plant as *Struthiopteris germanica*, var. *pensylvanica*.[4]

A comparison of a series of European specimens with the American material indicates that the earlier students of our flora were apparently correct in their interpretation of the American and the European plants as distinct species. In *Matteuccia Struthiopteris* of Europe the fertile frond has subentire or merely undulate pinnae. These are well illustrated by Schkuhr (Krypt. Gew. i. t. 105), by Hooker & Bauer (Gen. Fil. t. 69 A), by Britten (Eur. Ferns), by Ettingshausen & Pokorny (Physiotypia Pl. Austr. i. t. 14), and by Thomé (Fl. von

[1] Schkuhr, Krypt. Gew. i. 96, 97, tt. 104, 105 (1809).
[2] Desv. Mém. Soc. Linn. Paris, vi. pt. 2. 287 (1827).
[3] Willd. Sp. v. 289 (1810).
[4] Lowe, Ferns, Brit. and Exot. ii. 138 (1862).

Deutschl. i. t. 24); and they are indicated by the phrase of Ledebour and of Koch: "pinnis linearibus integris."[1] In the American plant the fertile pinnae are commonly pinnatifid or, as originally expressed by Michaux, "quasi noduloso-articulatis." This character, well shown in fairly mature specimens, is also indicated in the illustrations in Schkuhr's *Kryptogamische Gewächse*, i. t. 104.

In all the European material examined the stipe (especially the base) of the fertile frond bears closely appressed firm lustrous blackish scales, and these scales are apparently found on the stipes of the sterile fronds as well. Such sterile fronds as the writer has seen have been cut above the base, but in his detailed account of the plant Mr. James Britten says: "The petiole is short, and is dilated at the base, where it joins the stem, and there covered with nearly black scales."[2] The writer has closely examined more than 100 numbers of the American plant, mostly showing the base of the stipe, and in no case has he been able to find any of the appressed black scales which characterize the base of the stipe in the European. He has also failed to find black scales on the fresh material. Instead the American plant has the base of the stipe covered with very thin membranous pale brown or cinnamon-colored scales.

The sterile frond of the European plant is broadly oblong to oblong-lanceolate and comparatively thin in texture; that of the American plant more elongate and of firmer texture, the margins of the pinnules often revolute. In the European the pinnae are nearly horizontal, in the American commonly more obliquely ascending; and the American plant is more erect and of greater stature than the European. Thus, Moore, describing the European plant, speaks of the sterile fronds as "reclining at an angle of about 50°,"[3] and Britten speaks of them as "elegantly curved outwards,"[4] and Moore recognized his *Struthiopteris germanica*, var. *pensylvanica* because it "is more erect in habit." As to stature, Britten says of the sterile fronds of the European plant, "sometimes attaining a length of as much as five feet, though usually about three feet" and "the main pinnae are four or five inches long"; while Ascherson & Graebner, going into more detail, say that the frond is "up to 1.7 m. long" and that its stipe is "up to 12 cm.

[1] Ledeb. Fl. Ross. iv. 527 (1852–53); Koch, Fl. Germ. ed. 3, 739 (1857).
[2] Britten, Eur. Ferns, 2 (1881).
[3] Moore, Ferns Brit. and Exot. ii. 138 (1862).
[4] Britten, Eur. Ferns, 2 (1881).

long."[1] In the American plant, on the other hand, fronds only 3 feet long would be considered small, those of 5 or 6 feet in length being common, while luxuriant fronds are said to exceed 10 feet (3 m.). The pinnae of the American plant vary, according to luxuriance, from 2–7 inches (5–18 cm.) in length, and the stipe of the sterile frond from $2\frac{3}{4}$–14 inches (7–35.5 cm.) in length.

Departing from the European *Matteuccia Struthiopteris* in nearly all details and quite isolated from it, the North American plant seems to be, as treated by the earlier students of our flora, a distinct American species which should be called

MATTEUCCIA **nodulosa** (Michx.), n. comb. *Onoclea nodulosa* Michx. Fl. Bor. Am. ii. 272 (1803) as to description and type-specimen, not as to synonyms and habitat; Schkuhr, Krypt. Gew. i. 96, t. 104 (1809). *Struthiopteris pensylvanica* Willd. Sp. v. 289 (1810). *S. nodulosa* Desv. Mém. Soc. Linn. Paris, vi. pt. 2, 287 (1827). *S. germanica*, var. *pensylvanica* Lowe, Ferns, Brit. and Exot. ii. 138 (1862).

GRAY HERBARIUM.

THE HEMLOCK SPRUCE.

OLIVER A. FARWELL.

IN RHODORA for March, 1915, Mr. Alfred Rehder published a criticism of my paper on "the correct name of the Hemlock Spruce" which appeared in the issue of the Bulletin of the Torrey Botanical Club for December, 1914. I shall not attempt to answer the salient points of his discussion in the order in which they are given but will take analogous but non-contiguous features, and bring them together in order to show as clearly as possible the inconsistencies and fallacies of his statements and conclusions.

In dealing with specific names and the species which they represent two axioms are in general use. The first is that any species which has had the type specifically mentioned or designated by the author stands or falls with that type; the author's specific name cannot be transferred to another plant. The other is that where the type has

[1] Asch. & Graebn. Syn. i. 43 (1896).

not been specifically mentioned or designated, the first author revising the species must of necessity make his own choice as to which element shall bear the name. That choice should be, and perhaps is, generally, determined by the internal evidence.

Mr. Rehder fails to see wherein my reference to Article 46 of the Vienna Rules bears upon the case at issue since the Article mentioned treats of the combining of two or more species and not of the division of one. The Vienna Rules are general laws for the guidance of such botanists as have subscribed to them. In the treatment of species, the first author revising them is given, under certain conditions, the choice of making his own interpretation as to the application of the specific names and subsequent revisers cannot alter this interpretation. The Vienna Congress in handling this subject relating to the treatment of species first considers the combining of species and it is here that the general law making the author's choice of name, under certain conditions, permanent, is expressed. When considering the division of a species, the Congress, acting upon the basis that "brevity is the soul of wit," declined, and justly so, to perpetrate a needless repetition.

In regard to the detailed description of *Pinus Balsamea* Linnaeus, which Mr. Rehder fails to see is not restrictive, it may be remarked that the leaves of *Tsuga caroliniana*, a species growing in Virginia, may be notched at the end, thus coming under the designation *subemarginatis*. Also that the leaves of *A. Fraseri* may be either emarginate or obtuse. Rehder claims that it had not been discovered at the time *P. Balsamea* was published. It would be more accurate to say that it was not *recognized* at the time as a *distinct species* but there is no evidence to prove that it was not known and included in *Pinus Balsamea*. It must therefore be considered in any discussion of the subject. The leaves of the Balsam Fir from Vermont show an emarginate apex but those from the Lake Superior district have no such markings but are as rounded and as obtuse as the leaves of the Hemlock. The leaves of the Hemlock Spruce are as broad as those of the Balsam Fir so they are *not excluded from consideration* by a comparison of the latter with those of the Silver Fir. The white bands on the under side of the leaves in the Hemlock are usually composed of four rows of stomata but frequently are of five or six and sometimes of seven or eight; those on leaves of the Balsam Fir of Lake Superior are generally of seven or eight rows but are frequently of any number between four and eight inclusive while those on trees from Vermont

from three to eight with six about the general run. It will therefore be seen from the foregoing that the Linnaean detailed description of *Pinus Balsamea* is not only not characteristic, for the leaves may be entire and obtuse and the rows of stomata as low as three, but it is broad enough to include the leaves of what are now considered as four species included under two genera. Not only that but the real characters, found in the cones, upon which the genera and species are separated are not even touched upon by Linnaeus. The Linnaean description may, therefore, mean any one of two or more species and *Pinus Balsamea* Linn., as to the specific name, is the Balsam Fir; as to the description, an undefinable aggregate; and as to the synonyms, the Hemlock Spruce.

Rehder claims that the Gronovian synonym, the Hemlock Spruce, is the type of *Pinus canadensis* Linn. because the Linnaean diagnosis "is taken nearly literally from the synonym of Gronovius." Further on he admits *Abies canadensis* Miller to be a new name for a different species because "Miller does not quote *Pinus canadensis* Linnaeus as a synonym." Miller does not quote the binomial, it is true, but he *does use the Linnaean specific name* and *he does use the Linnaean diagnosis* upon which Rehder lays so much stress and which "is taken nearly literally from the synonym of Gronovius. This shows as clearly as if " Miller "had expressly designated the Gronovian plant as the type of his species, that his" *Abies canadensis* "is based primarily on the plant described by Gronovius." In other words, if the Linnaean diagnosis is the type of *Pinus canadensis* to the exclusion of other matter not conspecific with it, the same must be true of Miller's *Abies canadensis* for the diagnosis and the specific name are the same in each and have the same origin thus making the two binomials synonymous even though Miller did not quote *Pinus canadensis* as a synonym. Rehder, therefore, fails to prove that *Abies canadensis* Miller is different from *Pinus canadensis* Linnaeus. Furthermore, since he insists that the Hemlock Spruce is the type of the latter it must also be the type of the former because the two, according to his own method of reasoning, have been proved to be synonymous. The fallacy is so evident that it needs no comment.

Rehder doubts that Miller intended to transfer the Linnaean species from *Pinus* to *Abies* and that if he actually had such intention he misapplied the name under the laws of priority. The only law of priority that will apply here is the one giving the first author revising

a species the privilege of choosing the specific name under certain conditions — Article 46 which, by inference, covers the division of species as well as the combination of them. *Pinus canadensis* Linn. *is an aggregate without a designated type* consisting of the White Spruce and the Hemlock Spruce. In transferring from *Pinus* to *Abies* Miller separated the two elements retaining the specific name and diagnosis for the White Spruce (the synonym of Miller) and giving a new name *Abies americana* to the Hemlock (the synonym of Gronovius). It is, therefore, very evident that Miller not only knew what he was about but that he intended to transfer the species and that the name was not misapplied since he used it in the sense that Linnaeus did — "*canadensis*" *being indicative of the White Spruce*, as *Balsamea is of the Balsam Fir*. Under the above mentioned Article this choice cannot be changed. As above shown Rehder completely fails to prove that the specific name "*canadensis*" was misapplied by Miller; he admits that *Abies canadensis* is the White Spruce; yet refers the *Pinus canadensis, a synonym*, to the Hemlock Spruce; the fallacy of Rehder's argument is very apparent.

The whole discussion revolves about the determination of a type for *Pinus canadensis* Linnaeus. If it can be shown that Linnaeus actually had the Hemlock Spruce in view for his *P. canadensis* it must be considered the type and in this case it must be admitted that Miller has misapplied the name. But did he? Will Mr. Rehder admit that Miller had the Hemlock in view for his *A. canadensis* because he used the Linnaean diagnosis which "was taken almost literally from the synonym of Gronovius?" Certainly not! Nor any one else! Then why for *P. canadensis?* In the first edition of the Species Plantarum Linnaeus placed two Hemlock synonyms under *P. Balsamea;* in the second edition he admitted another species, *P. canadensis*, to include the White Spruce and one of the synonyms (the more recent) of the Hemlock Spruce leaving the other (the older) where originally placed, under *P. Balsamea*. When Linnaeus used these synonyms he gave them the status of post-Linnaean publications and the older of these in point of actual publication, that of Plukenet, must therefore, under the law of priority, be considered to be the type of the Hemlock Spruce. This did not receive a binomial name until Miller named it *Abies americana*. But what was the incident that induced Linnaeus between 1753 and 1763 to establish a new species in this group of plants? Was it from anything Plukenet or Gronovius had written

during that decade? Most certainly not, for one had been long dead and the other had published nothing *new* upon the subject. It is not probable that a reperusal of the old writings had anything to do with the matter as these had already been thoroughly studied for the first edition; also the fact that the synonyms were separated and placed under two species, to neither of which they belonged, is very conclusive evidence that Linnaeus neither knew the Hemlock Spruce nor had any real conception of its status as a species and therefore could not have considered it a type. What then was the controlling factor in the establishment of *Pinus canadensis?* During the decade above referred to Miller published and described under the old style of nomenclature four species of this group and later illustrated at least one of them, the White Spruce. These publications of Miller brought the species prominently before Linnaeus who readily recognized the claims of the White Spruce to specific rank and, *on the strength of Miller's publications,* accorded it such as *Pinus canadensis* in the second edition of the Species Plantarum. Rehder claims that the specific name in *Pinus Balsamea* is indicative of what Linnaeus meant and furthermore that it shows Linnaeus did not get all his information regarding the Balsam Fir from the Hemlock synonyms cited under it. Does not the same reasoning apply when considering *P. canadensis?* Or will Mr. Rehder deny that it does and insist that Linnaeus obtained the specific name "*canadensis*" *from the writings of Gronovius on Virginia and the Hemlock Spruce?* The entire internal evidence shows conclusively that Linnaeus had the White Newfoundland Spruce in mind when he published *Pinus canadensis* notwithstanding he drew up his diagnosis from Gronovius, which, under the circumstances, was unfortunate. The proper specific name, therefore, for the Hemlock Spruce is the one first applied to it, that of *americana,* and the correct binomial, *Tsuga americana* (Miller) Farwell.

DEPARTMENT OF BOTANY, PARKE, DAVIS & CO., Detroit, Mich.

REPORTS ON THE FLORA OF THE BOSTON DISTRICT,—XX.

URTICACEAE.

BOEHMERIA.

B. cylindrica (L.) Sw. Wet places, common, but not reported from the southwest.

CANNABIS.

C. SATIVA L. Waste places; occasional, especially around cities.

CELTIS.

C. occidentalis L. Woods and pastures, also on seashore; along the coast from Plum Island to Duxbury, also at Lowell, Lexington, Concord, Lincoln, South Sudbury, and Waltham.

HUMULUS.

H. JAPONICUS Sieb. & Zucc. A Japanese species, escaped in waste places at Salem and Peabody (*J. H. Sears*, Oct. 5, 1904), Weston (according to *M. L. Fernald*), Roxbury (*G. G. Kennedy*, Oct. 9, 1907), and at Scituate (*Edward W. Cushman*).

H. LUPULUS L. Roadsides and waste places, evidently introduced in our territory. Reported from many stations.

LAPORTEA.

L. canadensis (L.) Gaud. Rich woods, rare; Groveland, Boxford, Belmont, Brookline, Natick, Cohasset.

MACLURA.

M. POMIFERA (Raf.) Schneider. Escaped on Page St., Danvers (*G. G. Kennedy*, Aug. 20, 1907). Introduced from the west.

MORUS.

M. ALBA L. Persistent and escaped; reported at twelve scattered stations.

M. RUBRA L. Ipswich, an old tree (*J. Robinson*, Aug. 8, 1876); Cambridge, dump near University Press (*A. S. Pease*, Oct. 12, 1908); occasional roadside escape, Southborough (*A. J. Eames*, July 31, 1910). Native in western New England, also west and south.

PARIETARIA.

P. pennsylvanica Muhl. Swampscott (*J. H. Sears*, July 25, 1885); waste ground, Percival St., Dorchester (*J. R. Churchill*, Sept. 22, 29, 1901); Concord (*Minot Pratt*) according to Dame & Collins, Fl. Middlesex Co. 92, 1888; Hingham according to Bouvé, Botany of Hingham, in History of Hingham, i. pt. 1, 124, 1893.

PILEA.

P. pumila (L.) Gray. Shady places in rich soil, frequent. No reports from southern towns.

ULMUS.

U. americana L. Moist soil, woods, fields and roadsides; common throughout.

U. CAMPESTRIS L. Established in roadside thicket, Danvers (*R. B. Mackintosh*, December, 1903); Medford (*L. L. Dame*, —, 1887; *C. H. Morss*, May 27, 1899); Seaver St., W. Roxbury (*C. W. Swan*, May 29, June 9, 1883); roadside escape, Canton (*G. G. Kennedy*, —, 1891).

U. fulva Michx. Rocky woods, rare; Georgetown, Boxford, Wenham, Bedford, Concord, Brookline, Dorchester. Probably introduced at last station.

U. SCABRA Miller. A small selfsown tree, now extinct, Cambridge (*W. Deane*, June 29, 1895); Dedham (*G. G. Kennedy*, May 24, 1891); roadside, Milton (*G. G. Kennedy*, June 5, 1891). This is the Scotch or wych elm, which ranges from Europe to Japan.

URTICA.

U. DIOICA L. Waste places, rare; Boston, Roxbury, Dorchester, Concord, Watertown, Framingham; Hingham, according to Bouvé, Botany of Hingham, in History of Hingham, i. pt. 1, 124, 1893.

U. gracilis Ait. Moist ground in waste places; common.

U. Lyallii Wats. Moist ground in waste places; numerous reports from central and northern portions of the district.

U. URENS L. Waste ground, infrequent, generally near the coast. Reported from Gloucester, West Gloucester, Andover, Malden, Revere, Boston, Sherborn.

SANTALACEAE.

COMANDRA.

C. umbellata (L.) Nutt. Dry woods and open ground, very common throughout.

LORANTHACEAE.

ARCEUTHOBIUM.

A. pusillum Peck. Parasitic on *Picea mariana*; at a pond near Skug River, Andover (*A. S. Pease*, Oct. 25, 1902); Wilmington (*A. S. Pease*, Oct. 18, 1902); Acton (*J. G. Jack*, May 10, 1898).

ARISTOLOCHIACEAE.

ASARUM.

A. canadense L. Rich woods and roadsides, infrequent. Probably introduced at most of its stations.

POLYGONACEAE.

EMEX.

E. SPINOSA Campd. Charlestown (*C. E. Perkins*, 1882, specimen in herb. N. E. Botanical Club). Native of Mediterranean region, Cape of Good Hope and the Antilles.

FAGOPYRUM.

F. ESCULENTUM Moench. Persistent after cultivation and escaping, frequent.

F. TATARICUM (L.) Gaertn. In similar situations; Nahant, Somerville, Cambridge, Dedham, Sherborn.

POLYGONELLA.

P. articulata (L.) Meisn. Dry sand and gravel, very common throughout.

POLYGONUM.

P. acre HBK. Wet soil, very common throughout.

P. acre HBK., var. **leptostachyum** Meisn. Well distributed throughout.

P. amphibium L. Ponds and shallow water. Apparently rather frequent in Essex County, also at Glacialis Pond, Cambridge (*G. G. Kennedy*, June 26, 1863); Framingham (*A. J. Eames*, Sept. 20, 1908).

P. amphibium L., f. **Hartwrightii** (Gray) Blake. (See RHODORA xv. 164, 1913.) Muddy shores, Chelmsford, Cambridge, W. Roxbury, Woburn, Sherborn.

P. amphibium L., f. **terrestre** (Leers) Blake. (See RHODORA xv. 164, 1913.) On Newburyport turnpike, Ipswich (*John A. Lowell*, no date); on shore near type in W. P. Upham's pond, Peabody (*J. Robinson*, July 30, 1874); Fresh Pond, Cambridge (*W. G. Farlow*, September, 1878).

P. ARENARIUM Waldst. & Kit. Vacant land, Back Bay, Boston (*W. P. Rich*, July 18, 1906); South Boston flats (*W. P. Rich*, July, 1899). See RHODORA x. 152, 1908. Native of southern Europe, extensively used in California for rockeries and bouquets.

P. arifolium L. Meadows, ditches and low woods; common throughout.

P. aviculare L. Dooryards, sidewalks and waste places; very common throughout.

P. aviculare L., var. **angustifolium** Meisn. Gravelly soil, Back Bay Fens (*A. S. Pease*, Oct. 9, 1906); waste ground, Dorchester (*J. R. Churchill*, Oct. 20, 1894).

P. aviculare L., var. **littorale** (Link) Koch. Edge of salt marshes; Revere, Chelsea, South Boston, Scituate and probably elsewhere on the coast.

P. aviculare L., var. **vegetum** Ledeb. Oak Island, Revere (*H. A. Young*, Aug. 3, 1882; *G. G. Kennedy*, Aug. 6, 1894); Boston (*C. E. Perkins*, June 12, 1879); chicken-yard, Sherborn (*M. L. Loomis*, July 15, 1912, July 25, 1913).

P. Bellardi All. S. Boston (*E. & C. E. Faxon*, July 3, 1879). Adventive from western Asia or eastern Europe.

P. Bistorta L. Garden escape, Boxford (*Rev. W. P. Alcott*, June 13, 1890); weed in garden, Malden (*W. H. Manning*, —, 1883; *Mrs. N. M. Hunnewell*, May 31, 1886). A boreal species, native of Eurasia and western North America.

P. Careyi Olney. Swamps and moist places, frequent. No reports from Plymouth County.

P. cilinode Michx. Dry ledges and clearings; occasional, especially on Cape Ann.

P. Convolvulus L. Gardens and waste places; common.

P. cuspidatum Sieb. & Zucc. Waste places; recently introduced, and especially frequent in Boston and immediate vicinity; also at Danvers, Wakefield, and Lexington.

P. dumetorum L. Rich soil; reported from only eight stations, but probably much more common than this would indicate.

P. dumetorum L., f. **cristatum** (Engelm. & Gray) Robinson. Blue Hills, W. Quincy, common (*J. R. Churchill*, Aug. 29, 1891).

P. erectum L. Fields and waste places; occasional in central and northern towns.

P. exsertum Small. Brackish meadows and salt marshes; Ipswich, Cambridge, Boston, Brighton.

P. glaucum Nutt. (See Rhodora xv. 68–73, 1913.) Revere (*C. E. Faxon*, no date; the specimen is in the Gray Herbarium). The specimens quoted by John Robinson, Fl. Essex Co. 92, 1880 as *P. maritimum* L. although some are immature, seem to be *P. prolificum* (Small) Robinson.

P. Hydropiper L. Moist soil, very common throughout.

P. hydropiperoides Michx. Brooks and swamps; common throughout.

P. hydropiperoides Michx., var. **strigosum** Small. Wayland, Wellesley, Dedham, Milton, Canton.

P. lapathifolium L. Fields, gardens and waste places, common.

P. lapathifolium L., var. **incanum** (Willd.) Koch. Stony and gravelly shores and wet places; Spot Pond, Stoneham; Winter Pond and North Reservoir, Winchester; dump, Boston; flats, South Boston; low cultivated ground, Sherborn.

Specimens from all these places have been carefully examined. They have the small achenes of *P. lapathifolium* L. and should be referred to the above variety rather than as a variety to *P. tomentosum* Schrank.

P. lapathifolium L., var. **nodosum** (Pers.) Weinmann. Cultivated ground, Sherborn (*M. L. Loomis*, Aug. 2, 1910 et seq.).

P. Muhlenbergii (Meisn.) Wats. Muddy places and shallow water, occasional.

P. ORIENTALE L. Garden escape; occasional.

P. pennsylvanicum L. Moist soil, common throughout.

P. PERSICARIA L. Waste places and gardens, very common throughout.

P. prolificum (Small) Robinson. Salt marshes and beaches; common along the coast.

P. ramosissimum Michx. Salt marshes, Watertown (*F. S. Collins*, July 28, 1886); waif in dry sand by railway, Belmont (*C. H. Knowlton*, Aug. 26, 1911).

P. ramosissimum Michx., f. **atlanticum** Robinson. Medford, Cambridge, Watertown, Dorchester, Scituate. A peculiar form from Oak Island, Revere, somewhat resembling *P. erectum* probably belongs here.

P. RURIVAGUM Jord. Watertown (*C. E. Perkins*, Aug. 25, 1881). An Old World species.

P. sagittatum L. Low grounds, very common and abundant throughout.

P. scandens L. Swamps and wet thickets, common.

P. tenue Michx. Dry rocky and sandy places, frequent.

P. virginianum L. Moist shady places; Lexington; Beaver Brook Reservation, Belmont; Stony Brook Reservation in W. Roxbury and Hyde Park.

RHEUM.

R. RHAPONTICUM L. Open field, Beaver Brook Reservation, Belmont (*W. Deane*, Apr. 25, 1896). Frequently persistent after cultivation, but seldom collected. Originally from southern Siberia.

RUMEX.

R. Acetosa L. Roadsides, Georgetown (*J. H. Scars*, June 12, 1905); Medfield (*K. M. Wiegand*, June 23, 1909).

R. Acetosella L. Dry fields, especially in acid soil; very common and abundant throughout. Noticed near Salem in 1628 by Francis Higginson.

R. altissimus Wood. Near Audubon Road, Boston (*C. W. Swan*, Aug. 25, 1899); vacant lot, Fenway, Boston (*C. H. Knowlton*, June 25, 1908). Adventive from the West.

R. Britannica L. Swamps and marshes, frequent throughout.

R. crispus L. Fields and waste places; a common weed throughout.

R. hastatulus Baldw. Salisbury beach (*A. A. Eaton*, Aug. 31, 1912, specimen in Gray Herb.).

R. maritimus L., var. **fueginus** (Phil.) Dusén. (See Rhodora xvii. 73–83, 1915.) Charlestown (*C. E. Perkins*, July or August, 1881); South Boston flats (*C. E. Perkins*, July 10, 1879).

R. mexicanus Meisn. Low waste ground near Cottage Farm, Brighton (*F. F. Forbes*, June 23, 1912).

R. obtusifolius L. Fields and waste places, common throughout.

R. pallidus Bigel. Sea beaches and salt marshes, frequent along the coast.

R. Patientia L. Moist thickets and waste places; Andover, Manchester, Wakefield, Weston, Wellesley, Framingham, Sherborn, Hingham.

R. persicarioides L. Sandy Cove, Bayview, Gloucester (*W. P. Rich & E. F. Williams*, Aug. 15, 1897 and *M. L. Fernald, F. W. Hunnewell & B. Long*, September 11, 1913).

R. verticillatus L. Cohasset (*Miss Lincoln*, no date; specimen in herb. Boston Soc. Nat. Hist.). Adventive from further west.

[*Chorizanthe pungens* Benth. N. Chelmsford, wool-waste (*Rev. W. P. Alcott*; specimen in herb. of), adventive from California, according to Dame & Collins, Fl. Middlesex Co. 88, 1888. Mr. Alcott seems to have been a keen observer, but the committee has been unable to locate his herbarium.]

CHENOPODIACEAE.

ATRIPLEX.

A. arenaria Nutt. Edges of salt marshes and seashore; Salisbury, Plum Island, Beverly, Lynn, and in nearly every coastal town or city from Cambridge to Duxbury.

[" *A. bracteosa* Wats. N. Chelmsford, wool-waste (Rev. W. P. Alcott). Adv. from Cal.", according to Dame & Collins, Fl. Middlesex Co. 84, 1888.]

A. patula L. Salt marshes and waste places near the coast, rather common.

A. patula L., var. **hastata** (L.) Gray. Common and abundant, with the typical form.

A. patula L., var. **littoralis** (L.) Gray. Frequent, with the typical form.

A. ROSEA L. South Boston flats (*C. E. Perkins*, Aug. 9, 1879; Sept. 5, 1881; specimens in herb. N. E. Botanical Club).

BASSIA.

B. HIRSUTA (L.) Aschers. Made land near sea, South Boston (*C. H. Knowlton*, Sept. 12, 1908 et seq.). A large area is fully occupied by this saline species. (See RHODORA xi. 120, 1909.) Also on woolwaste at Westford (*Miss E. F. Fletcher*, October, 1910).

CHENOPODIUM.

C. ALBUM L. Common weed in waste places and gardens everywhere.

C. ALBUM L., var. VIRIDE (L.) Moq. Frequent, with the typical form.

C. AMBROSIOIDES L. Waste places; very abundant around cities, frequent elsewhere.

C. AMBROSIOIDES L., var. ANTHELMINTICUM (L.) Gray. Occasional in waste places.

C. BONUS-HENRICUS L. Roadside next Botanical Garden, Cambridge, no date; Back Bay, Boston (*Miss F. C. Prince*, no date).

C. BOSCIANUM Moq. Vacant lot, Back Bay, Boston (*W. P.*

Rich, Aug. 27, 1900; specimen in herb. W. P. Rich). Adventive from west or south.

C. Botrys L. Waste places and gardens, frequent.

C. capitatum (L.) Aschers. Waste places rare; Salem, Lowell, Sherborn, Hingham. Adventive from further west.

C. glaucum L. Gardens and waste places; frequent near Boston, occasional elsewhere.

C. graveolens Lag. & Rodr. Turnip patch, dressed with wool-waste, Chelmsford (*C. W. Swan*, Sept. 20, 1885; specimen in herb. Yale University and herb. N. E. Botanical Club). A native of the American tropics from Mexico to Bolivia; also in tropical Africa and Arabia.

C. hybridum L. Dry open woods (its original habitat) and waste places, common throughout.

C. leptophyllum Nutt. Sand dunes, beaches and borders of salt marshes; Plum Island, Revere, Dorchester and perhaps elsewhere; also adventive at Sherborn (*M. L. Loomis*, Aug. 3, 1911; July 23, 1912).

C. multifidum L. South Boston flats (*C. E. Perkins*, 1881; specimen in herb. N. E. Botanical Club). Native of South America.

C. murale L. Waste land; Newburyport, Charlestown, Roxbury, Dorchester; Tewksbury and Framingham, according to Dame & Collins, Fl. Middlesex Co. 83, 1888.

[*C. polyspermum* L. Framingham (*Rev. J. H. Temple*), according to Dame & Collins, Fl. Middlesex Co., 83, 1888.]

C. rubrum L. Salt marshes; Rockport, Gloucester, Revere, Medford, Quincy. "'Near the mouth of Saugus river' (Dr. Chas. Pickering) 'Annisquam' (Mrs. Downs).", according to Robinson, Fl. Essex Co. 90, 1880.

C. urbicum L. Waste places, occasional. Collected on Boston Common by E. Tuckerman, Jr., in July, 1843.

C. virgatum Thunb. Bond St., Cambridge (*Roger Warner*, June 28, 1885; specimen in herb. W. Deane). Native of Japan.

KOCHIA.

K. Scoparia (L.) Schrad. Roadside in old town and abundant in gardens at Marblehead (*W. Deane*, Aug. 30, 1911); dump on vacant lot, Fenway, Boston (*C. H. Knowlton*, Aug. 6, 1911).

SALICORNIA.

S. ambigua Michx. Salt marshes and wet sea-beaches. Rare on North shore; Annisquam, Gloucester (*J. H. Sears*, 1892); Lynn (*J. Robinson*, Sept. 14, 1875); Revere (*C. H. Knowlton*, Aug. 20, 1908). "At Gloucester, Mass. Pickering. 1825." William Oakes in Hovey's Magazine xiii. 219, 1847. Frequent from Hingham to Plymouth.

S. europaea L. Salt marshes, common throughout.

S. europaea L., var. **pachystachya** (Koch) Fernald. Nahant (*K. M. Wiegand*, Oct. 2, 1908; specimen in herb. Wellesley College).

S. mucronata Bigel. Salt marshes, frequent.

SALSOLA.

S. Kali L. Sea-beaches, occasional.

S. Kali L., var. **caroliniana** (Walt.) Nutt. More abundant than the typical form.

S. Kali L., var. TENUIFOLIA G. F. W. Mey. Gardens and waste places; occasional, but apparently not spreading.

SPINACIA.

S. OLERACEA L. Rubbish heap, Winchester (*M. L. Fernald*, May 26, 1907).

SUAEDA.

S. linearis (Ell.) Moq. Salt marshes, common throughout.

S. maritima (L.) Dumort. Salt marshes, frequent throughout.

S. Richii Fernald. Prostrate in sand below high tide, and in salt marshes; Plum Island (*E. F. Williams*, Aug. 4, 1899); Ipswich (*J. H. Sears*, Aug. 24, 1886; September, 1887); Bass Rocks, Gloucester (*E. F. Williams*, Aug. 14, 1898).

AMARANTHACEAE.

ACNIDA.

A. cannabina L. Edges of clayey tidal estuaries, from Newburyport to Dorchester; not reported on the South Shore, probably because the shores are sandy.

A. TAMARISCINA (Nutt.) Wood. Introduced in waste, Goulding's Mill, Malden (*F. S. Collins*, Sept. 25, 1887; specimen in herb. Gray). Adventive from the west.

A. tuberculata Moq. Roadside, Medford (*F. S. Collins*, August, 1887; in Dame & Collins, Fl. Middlesex Co. 86, 1888 as *A. rhyssocarpa* Moq.); along the river, Concord (*E. F. Williams*, Sept. 17, 1879); abandoned chicken-yard, Sherborn (*M. L. Loomis*, Oct. 18, 1913).

AMARANTHUS.

A. BLITOIDES Wats. Waste sandy ground, frequent. Adventive from the west.

A. CAUDATUS L. Waste places; W. Chelmsford, Lynn, Wakefield, Woburn, Cambridge. An Old World species, spreading from the American tropics.

[Rev. Manasseh Cutler, writing from Ipswich in 1784, reported the Bloody Amaranth or Love Lies Bleeding as growing "amongst rubbish" (Mem. Am. Acad. i. 490, 1785). Robinson's Flora of Essex Co., 91, 1880, identifies Cutler's plant with the above.]

A. CRUENTUS L. Gardens and waste places; Medford (*Wm. Boott*, 1863–4); Cambridge (*A. Gray*, 1876); S. Boston (*E. F. Williams*, Sept. 18, 1898). An Old World species.

A. GRACILIS Desf. S. Boston (*E. & C. E. Faxon*, 1878; specimen in herb. N. E. Botanical Club). An Old World species.

A. graecizans L. Waste places and gardens, common.

A. HYBRIDUS L. Waste and cultivated ground, common.

A. HYBRIDUS L., f. HYPOCHONDRIACUS (L.) Robinson. Rare weed in gardens, Framingham (*A. J. Eames*, Sept. 13, 1914; Concord, persistent for four years on a dump (*A. W. Hosmer*, RHODORA i. 224, 1899).

A. PALMERI Wats. Cotton mill waste, Goulding's Mill, Malden (*F. S. Collins*, Sept. 25, 1887 et seq.); S. Lawrence (*A. S. Pease*, Sept. 23, 1902). Adventive from the west.

A. PANICULATUS L. Waste places, infrequent.

A. POWELLII Wats. Weed in cultivated ground, Tewksbury (*E. F. Williams & W. P. Rich*, Aug. 12, 1900); Weston, roadside (*E. F. Williams*, Sept. 5, 1897). Fugitive from western United States.

A. RETROFLEXUS L. Cultivated ground and waste places, common throughout.

A. SPINOSUS L. Waste places; Lowell, Lynn, Malden, Boston, South Boston.

A. VIRIDIS L. Goulding's Mill, Malden (*F. S. Collins*, Aug. 30, 1887); dump, South Boston (*E. & C. E. Faxon*, 1878).

GOMPHRENA.

G. GLOBOSA L. Dump, Boston (*C. W. Swan*, Sept. 14, 1886; specimen in herb. Yale University).

PHYTOLACCACEAE.

PHYTOLACCA.

P. americana L. (L. Sp. ed. 1. *P. decandra* L. Sp. ed. 2.) Dry pastures, open woods and roadsides; common throughout.

C. H. KNOWLTON, WALTER DEANE } *Committee on Local Flora.*

AN ALBINO VIOLA ROSTRATA.— In a large collection of plants from northern New York, Mrs. Orra Parker Phelps includes a beautiful white-flowered form of the ordinarily lilac- and violet-flowered *Viola rostrata*. The albino which formed a colony of more than one hundred plants is quite as striking in its departure from the normal form of the species as *V. cucullata*, forma *albiflora* Britton, and *V. pedata*, forma *alba* Britton. It may be called

VIOLA ROSTRATA Pursh, forma **Phelpsiae**, n. f., corollis albidis.— NEW YORK: beech woods, Pierrepont, May 20, 1914, *Orra Parker Phelps*, no. 699 (TYPE in Gray Herb.).— M. L. FERNALD.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY.— NEW SERIES, NO. XLIV.

THE GENUS EUPHRASIA IN NORTH AMERICA.

M. L. Fernald and K. M. Wiegand.

Although furnishing by their bright flowers much of the late-summer coloring of open habitats in eastern and northern New England and the more northerly regions, the Eyebrights seem to have attracted little notice in American botany until the past two decades. Michaux collected the characteristic species (*Euphrasia canadensis*) of the region of the city of Quebec on July 21, 1792; but it appeared in his *Flora* without statement of locality and under the indefinite name *Euphrasia officinalis* L. Pursh treated the Michaux plant as *E. officinalis* and also recorded a Labrador plant which he supposed to be Willdenow's *E. latifolia*. Other early American botanists apparently did not know of the genus *Euphrasia* in America; or such rare specimens as reached herbaria were treated as *E. officinalis* or varieties of it.

The first record of a *Euphrasia* in the United States seems to have been by William Oakes, who in 1847 listed as *E. officinalis* the little alpine plant which has subsequently been named *E. Oakesii* and added the significant note: "Stem dwarf, simple; leaves roundish, with obtuse teeth; flowers very pale, and extremely minute. It is probably E. micrantha *Reichenbach*, Fl. Exc. p. 358. . . . In the alpine region of the White Mountains. 1844." [1] In the 1st edition of Gray's *Manual* Oakes's White Mountain plant appeared as *E. officinalis*, but with the

[1] Oakes in Hovey's Mag. xiii. 217, 218 (1847).

added note that it is "a dwarf variety, 1′–5′ high, with very small flowers." [1] In the 2nd edition, however, Dr. Gray augmented the statement by adding to the White Mountain record "L. Superior, and northward" and by stating that the American "variety" is "E. pusilla, *Godet, mss.*" [2] Godet seems, though, never to have published his *E. pusilla*, although in a letter to Gray, under date of March 1, 1854, he wrote: "Votre *Euphrasia officinalis alpina* (White Mountains, Coll. Oakes) est une espèce parfaitement distincte de notre plante. Je l'ai nommée *E. pusilla* dans mon herbier." That Godet also named another species in his herbarium *E. pusilla* is indicated by the fact that, in his *Monographie der Gattung Euphrasia*, Wettstein cites the herbarium-name *E. pusilla* Godet as a synonym of *E. arctica* Lange (*E. latifolia* Pursh, as to the Labrador plant); while the Lake Superior plant of Gray's 2nd edition, where the name *E. pusilla* was published, was also *E. arctica;* and the plants known to Gray from "northward" were partly *E. arctica*, partly at least two other species, *E. canadensis* Townsend and *E. disjuncta* Fernald & Wiegand. The name *E. pusilla*, therefore, has not a clear signification nor did the publication of it by Gray in a somewhat incidental manner as having been applied to a "variety" of *E. officinalis* give it the standing necessary for a specific name.

This treatment of *Euphrasia* in temperate eastern America was carried unchanged through the next three editions of the *Manual*, but in the *Synoptical Flora* Gray treated some of the common plants of the coast of eastern Maine and adjacent Canada (*E. americana* and *E. stricta*) as *E. officinalis*, "perhaps introduced from Europe"; [3] while the plants known to Gray from the alpine region of the White Mountains (*E. Oakesii*), the shore of Lake Superior (*E. arctica*), the northern Rocky Mountains (*E. disjuncta*), the Aleutian Islands (*E. mollis*) and "far northward" (*E. disjuncta, E. arctica*, etc.) were treated as var. *tatarica*, a plant known to the writers only from Eurasia and from the eastern counties of Quebec. This interpretation was followed by Watson & Coulter in the 6th edition of Gray's *Manual;* and, except that in 1873 Reeks, in an obscure publication upon Newfoundland, had published a new *E. purpurea*,[4] overlooked by the

[1] Gray, Man. 309 (1848).
[2] Gray, Man. ed. 2, 295 (1856).
[3] Gray, Syn. Fl. ii. pt. 1, 305 (1878).
[4] Reeks, List of Fl. Pl. and Ferns of Newfoundland, 4 (1873).

editors of *Index Kewensis* and by recent students of the genus, it was not until the appearance of Wettstein's *Monographie* in 1896 that it was recognized that in North America *Euphrasia* consists of several distinct species, most of them not satisfactorily referable to Old World species.

Wettstein definitely recognized in North America *E. americana* Wettstein, *E. latifolia* Pursh, in part (*E. arctica* Lange), *E. mollis* Ledeb., *E. Oakesii* Wettstein, *E. Rostkoviana* Hayne and, with doubt, *E. hirtella* Jordan. In 1898 Townsend added *E. canadensis* [1] (presumably including the Quebec plant which had been the basis of Wettstein's record of *E. Rostkoviana*, a well marked species not subsequently credited to North America); and in 1901, Robinson,[2] summarizing the knowledge of the American species at that time, recognized seven species and two varieties: *E. mollis*, *E. Oakesii*, *E. Williamsii* Robinson, *E. Randii* Robinson, *E. Randii*, var. (?) *Farlowii* Robinson, *E. latifolia*, *E. hirtella*, *E. americana*, and *E. americana*, var. *canadensis* (Townsend) Robinson.

In subsequent publications, for instance in the 7th edition of Gray's *Manual*, Robinson's treatment has been only slightly modified; but explorations to the northeast of the Manual range have recently brought together so much additional material of the genus that it has seemed advisable to present a new study of the Eyebrights based upon a somewhat extended field-knowledge of the plants and a prolonged herbarium-study; and, although the present summary of our knowledge necessarily leaves for further consideration some problematic plants of which we have inadequate material, it may prove useful as a fresh basis for further study of the genus.

Synopsis of North American Species and Varieties of Euphrasia.

A. Upper lip of corolla very shallowly bilobed; the lobes very short, rounded, entire, narrowly revolute, rarely erect: lower lip scarcely fan-shaped, not exceeding the upper: flowers very small, 2.2–4 (rarely 4.8) mm. long: bracts with blunt teeth. B.

B. Inflorescence capitate or subcapitate, the flowers closely crowded, only the 1–4 lowest pairs of bracts becoming slightly remote in maturity. C.

C. Corolla whitish to lilac: nodes below the head 2–5: leaves pubescent.....1. *E. Oakesii*.

[1] Townsend, Journ. Bot. xxxvi. 1, t. 381 (1898).

[2] Robinson, Rhodora, iii. 270–276 (1901).

C. Corolla deep brownish-purple or chocolate-color: nodes below the head 4–9.
Leaves glabrous: nodes below the head 4–7 . . . . . 2. *O. Williamsii.*
Leaves pubescent: nodes below the head 5–9.
(2.) *E. Williamsii*, var. *vestita.*

B. Inflorescence becoming loose and elongate, flowers or capsules scattered, the mature spike with many remote bracts. D.
D. Leaves glabrous on both surfaces: corolla deep purple to cream-color . . . . . 3. *E. purpurea.*
D. Leaves pubescent on both surfaces.
Leaves sparingly crisp-pubescent on both surfaces, the primary ones 5–18 mm. long: corolla deep purple (rarely whitish) with dark lines . . . . . (3.) *E. purpurea*, var. *Randii.*
Leaves very densely pubescent, the primary ones 2–7 mm. long: corolla whitish (rarely purple).
(3.) *E. purpurea*, var. *Farlowii.*

A. Upper lip of corolla plainly bilobed; the lobes somewhat reflexed from the base (not revolute), truncate, and from undulate to coarsely 3-toothed: lower lip in larger forms fan-shaped, spreading and very conspicuous: flowers rather large, 4–10 mm. long: bracts with acute or acuminate, rarely obtuse, teeth. E.
E. Bracts with acute or obtuse teeth: leaves pubescent. F.
F. Inflorescence nearly capitate, in maturity with the 1–3 lower pairs of bracts remote: teeth of bracts obtuse: leaves very pubescent: corolla 5–6 mm. long . . . . . 4. *E. mollis.*
F. Inflorescence spicate, becoming loose and elongate: teeth of bracts acute: leaves very pubescent to almost glabrous.
Internodes long: inflorescence open, the lowest bracts in maturity 2–5 cm. apart: bracts spreading: corolla 4–5.5(–6) mm. long 5. *E. disjuncta.*
Internodes short: inflorescence dense above, the lowest bracts in maturity 0.5–2 cm. apart: bracts ascending: corolla 5–7 mm. long 6. *E. arctica*
E. Bracts with subulate or bristle-tipped teeth: leaves pubescent or glabrous. G.
G. Spikes comprising the larger portion of the plant, beginning near the base of the stem and branches. H.
H. Corolla 5–6.5 mm. long, with pale-lavender or bluish lines; the lower lip with the lateral lobes not strongly spreading.
Bracts oblong, pubescent: branches strongly ascending. 7. *E. hudsoniana.*
Bracts orbicular or broadly oval, glabrous: branches arcuate-ascending . . . . . 8. *E. canadensis.*
H. Corolla 6–8 mm. long. with dark-purple lines; the lower lip with wide-spreading lateral lobes.
Bracts glabrous . . . . . 9. *E. stricta.*
Bracts pubescent . . . . . (9.) *E. stricta*, var *tatarica.*

G. Spikes occupying only the upper half or third of the stem and branches: corolla large, 7–9 mm. long, with dark-purple lines; lower lip with wide-spreading lateral lobes.....10. *E. americana.*

1. E. Oakesii Wettstein, Monog. d. Gatt. Euphrasia, 142, t. 4. figs. 211–215, t. 12, fig. 6 (1896) and Bot. Gaz. xxii. 401 (1896); Britton & Brown, Ill. Fl. iii. 182, fig. 3327 (1898); Fernald, Rhodora, iii. 176 (1901); Robinson, ibid. 272 (1901); Eggleston, Rhodora, iv. 108 (1902); Fernald, Rhodora, ix. 163 (1907); Robinson & Fernald in Gray, Man. ed. 7, 733 (1908). *E. officinalis* Oakes in Hovey's Mag. xiii. 217 (1847); Gray, Man. 309 (1848) as to the Oakes plant; J. I. & A. B. Northrop, Bull. Torr. Bot. Cl. xvii. 27 (1890), in part. *E. pusilla* Godet acc. to Gray, Man. ed. 2, 295 (1856), as to the Oakes plant. *E. officinalis*, var. *tatarica* Wats. & Coult. in Gray, Man. ed. 6, 392 (1890), in part, not Benth. *E. orbicularis* Townsend acc. to Wettst. l. c. 143 (1896). *E. albimontana* Boiss. acc. to Wettst. l. c. (1896.)— Low, often very dwarf, 2–8 (rarely –12) cm. high, usually unbranched: stem crisp-pubescent: leaves 2–5 pairs below the inflorescence, smaller than the bracts, 1.5–7 mm. long, ovate to orbicular, crisp-pubescent on both faces: bracts similar in shape, with rounded teeth: inflorescence at first distinctly capitate, in maturity globose to ellipsoid, 0.5–2.5 cm. long, at most with the 1 or 2 lowest pairs of bracts becoming slightly remote: corolla 2.5–3.3 mm. long, whitish, with violet lines; upper lip shallowly bidentate, with narrow revolute entire margins; lower lip with oblong bidentulate lobes; throat yellow.— Exposed crests and bleak mountain summits, Labrador, Maine and New Hampshire. Labrador: on rocks, north shore of Battle Harbor, August 6–13, 1911, *C. S. Williamson*, no. 713. Maine: wet shelves and crevices, 1220–1375 m. altitude, north and west walls of North Basin, Mt. Katahdin, July 13–14, 1900, *Williams & Fernald.* New Hampshire: "in alpinis Montium Alborum," 1844, *Wm. Oakes;* gravelly plains, summits of White Mountains, August 16 and 28, 1877, *C. G. Pringle;* White Mountains, August 9, 1881, *W. H. Manning*; Crawford Path at Mt. Monroe, August 28, 1877, August 5, 1879, August 15, 1881, September 13, 1891, and July 8 and 31, 1893, *E. & C. E. Faxon*, August 15–20, 1898, *W. W. Eggleston*, August 4, 1901, *E. F. Williams*; open shaly ground, head of Oakes Gulf, August 4, 1901, *E. F. Williams & B. L. Robinson*, Pl. Exsicc. Gray., no. 61; Oakes Gulf, about 1375 m., August 17–24, 1901, *W. W. Eggleston*, no. 2408; edge of Oakes Gulf, August 14, 1902, *A. S. Pease.*

1a. Forma **lilacina**, n. f., corollae lobis valde lilacinis.

Lobes of the corolla deep lilac.— Labrador: exposed crests of limestone and calcareous sandstone terraces, Blanc Sablon, August 6, 1910, *Fernald & Wiegand*, no. 3988 (type in Gray Herb.).

2. E. Williamsii Robinson, Rhodora, iii. 272 (1901); Fernald, Rhodora, ix. 163 (1907); Robinson & Fernald in Gray, Man. ed. 7,

733 (1908); Britton & Brown, Ill. Fl. ed. 2, iii. 218 (1913).— Plant simple or sparingly branched, 3–12 cm. high: stem pubescent: leaves 4–7 pairs below the inflorescence, 2–9 mm. long, glabrous on both surfaces: inflorescence at first capitate, in maturity cylindric, 0.7–5 cm. long, usually with only the 1–4 lowest pairs of bracts becoming a little remote: bracts similar to and only slightly larger than the leaves, with obtuse teeth: corolla 2.5–4 mm. long, deep brownish-purple, similar in size and shape to that of *E. Oakesii*.— Barren ledges, alpine region of Mt. Washington, New Hampshire. New Hampshire: Cape Horn, Mt. Washington, August 6, 1896 and August 5, 1901, *E. F. Williams;* ledges near 5th Mile Post, Mt. Washington, August 6, 1896, *E. & C. E. Faxon*, September 12, 1904, and August 19, 1907, *A. S. Pease*, nos. 4107 and 10,595; stony ground and crevices of rocks, "Alpine Garden," Mt. Washington, August 5, 1901, *E. F. Williams & B. L. Robinson*, Pl. Exsicc. Gray, no. 60; Lion's Head, Mt. Washington, August 28, 1909, *A. S. Pease*, no. 12,527.

Very close to *E. Oakesii* but differing in the usually larger stature, with the more numerous cauline leaves only slightly smaller than the bracts; in the usually remote lower bracts; and in the deep chocolate-color of the corolla. In this species, as in several others, there is a glabrous and a pubescent trend: the former the typical plant of New Hampshire, the latter an alpine plant of Newfoundland.

2a. E. Williamsii, var. **vestita**, n. var., foliis pubescentibus, pilis crispis; nodiis infra inflorescentiam 5–9; bracteae dentibus plerumque acutiusculis.

Leaves crisp-pubescent, 5–9 pairs below the inflorescence: teeth of the bracts mostly acutish.— Newfoundland: dry diorite peak, Lookout Mountain, Bonne Bay, August 26, 1910, *Fernald & Wiegand*, no. 4009 (type in Gray Herb.); dry exposed thin soil on summit-ledges altitude 335–520 m., Blomidon, July 31 and August 7, 1908, *Eames & Godfrey*, nos. 8068 and 8069.

3. E. purpurea Reeks, List of Fl. Pl. and Ferns of Newfoundland, 4 (1873).— Simple or usually branched from near the base, 0.3–4 dm. high: stems crisp-pubescent: leaves glabrous or nearly so on both surfaces, with glabrous or ciliate margins, ovate-oblong to nearly orbicular, the primary ones 5–15 (rarely –18) mm. long; teeth from rounded to barely acute: bracts similar: inflorescences becoming very elongate; the primary one $\frac{1}{2}$–$\frac{3}{4}$ the full height of the plant, with 10–20 somewhat remote pairs of bracts; the lower bracts about one-half as long as the internodes: corollas 2.5–4 mm. long, from deep to pale purple with darker lines; throat usually with a yellow spot; upper lip shallowly notched, with revolute or rarely erect entire or bidentulate lobes; lower lip not distinctly fan-shaped, with ascending truncate or bidentulate linear or oblong lobes.— Grassy or peaty banks and brackish shores, western Newfoundland and eastern Quebec

to southern New Brunswick. NEWFOUNDLAND: damp shores, Port Saunders, August 6, 1910, *Fernald, Wiegand & Kittredge*, no. 3995; bog back of the strand, Cow Head (Reeks's type locality), July 22, 1910, *Fernald & Wiegand*, no. 3985; rocks and gravelly strand, Southeast Arm of Bonne Bay, August 31, 1910, *Fernald & Wiegand*, nos. 4006, 4007; moist banks in deep shade and in dry fields, near sea level, Bay of Islands, July 27 and 28, 1908, *Eames & Godfrey*, no. 8070; damp thicket, Bay St. George, August 5–7, 1901, *Howe & Lang*, no. 996; open bog in wet woods overlying carboniferous sandstone, Stephenville, August 15, 1910, *Fernald, Wiegand & Kittredge*, no. 3996; damp sandy shores, St. George's, August 13, 1910, *Fernald, Wiegand & Kittredge*, no. 3992; grassy shores, Port à Port, August 15, 1910, *Fernald, Wiegand & Kittredge*, no. 4003. QUEBEC: edge of brackish marsh, Pointe au Maurier, Canton Charnay, Saguenay County, August 26, 1915, *St. John;* turfy bank, La Grande Romaine, Canton Lagorgendière, Saguenay County, September 2, 1915, *St. John;* knolls in salt marsh, St. John (or Douglastown) River, August 23, 1904, *Collins, Fernald & Pease;* border of brackish marsh, Barachois de Malbaie, August 13, 1907, *Fernald*, no. 1168. MAGDALEN ISLANDS:[1] boggy margin of the strand at the Narrows, Alright Island, August 21, 1912, *Fernald, Long & St. John*, no. 8021; border of brackish marsh near Hospital Point, Grindstone Island, July 18, 1912, *Fernald, Bartram, Long & St. John*, no. 8017; knolls in the marsh at the border of a brackish pond, and on dry turfy crests of a sandstone sea-cliff, southwest of Étang du Nord village, Grindstone Island, August 15, 1912, *Fernald, Long & St. John*, nos. 8019, 8020; grassy bank near shore, Amherst Island, August 25, 1914, *St. John*, no. 1646. PRINCE EDWARD ISLAND: in grass upon damp brackish sands, Cape Aylesbury, August 29, 1912, *Fernald, Long & St. John*, no. 8022. NOVA SCOTIA: Bay St. Lawrence, Cape Breton Island, August 14, 1904, *J. R. Churchill.* NEW BRUNSWICK: along the sea-coast, Petitcodiac, August, 1884, *J. Britain*, Herb. Geol. Surv. Can. no. 17,438.

3a. E. PURPUREA, forma **candida**, n. f., corollae lobis albicantibus.

Lobes of the corolla whitish.— QUEBEC: on anorthosite, east side of Great Basque, Seven Islands, August 15, 1907, *C. B. Robinson*, no. 943. MAGDALEN ISLANDS: knolls at border of brackish marsh, East Cape, Coffin Island, July 19, 1912, *Fernald, Bartram, Long & St. John*, no. 8018 (TYPE in Gray Herb.).

Forma *candida* seems closely to match material distributed by Birger as *E. bottnica* Kihlm. in Wettst., l. c. 299 (1896) from Sweden. If the pale-flowered *E. bottnica* of Scandinavia and *E. purpurea*, forma *candida* of northeastern America prove to be identical, we should

[1] Although at present belonging politically to Gaspé County, Quebec, the Magdalen Islands are so remote that they are here treated as a distinct geographic area.

naturally expect the more common American plant with purple flowers to be found in Scandinavia.

3b. E. PURPUREA, var. **Randii** (Robinson), n. comb. *E. officinalis*, form, Rand & Redfield, Fl. Mount Desert, 133 (1894). *E. Randii* Robinson, RHODORA, iii. 273 (1901); Kennedy, RHODORA, iv. 26 (1902); Robinson & Fernald in Gray, Man. ed. 7, 733 (1908); Cushman, RHODORA, xi. 13 (1909); Fernald & Wiegand, RHODORA, xii. 105 and 143 (1910); Britton & Brown, Ill. Fl. ed. 2, iii. 218, fig. 3842 (1913); Knowlton, RHODORA, xvii. 148 (1915).— Leaves and bracts sparingly crisp-pubescent on both surfaces.— Exposed turfy knolls, peaty crevices of sea-cliffs and borders of brackish marshes, Labrador to Gaspé Co., Quebec, and southward to the coast of Maine. LABRADOR: Cartwright, August 20, 1902, *Amos P. Brown* (herb. Phil. Acad.). QUEBEC: open sterile soil, western end of Bonaventure Island, August 7 and 8, 1907, *Fernald & Collins*, no. 1167. NOVA SCOTIA: on rocks, Englishtown, Cape Breton, August 2, 1898, *J. Macoun*, Herb. Geol. Surv. Can., no. 19,898; on rocks, Bell's Island, August 11, 1910, *J. Macoun*, Herb. Geol. Surv. Can., no. 80,663; in humus, edge of sea cliffs, Black Hole, Scott's Bay, August 24, 1902, *Fernald;* damp earth, Sable Island, July and August, 1899, *J. Macoun*, Herb. Geol. Surv. Can., nos. 22,557 and 22,557a; dune-hollow, Sable Island, August 21, 1913, *St. John*, no. 1319. NEW BRUNSWICK: Grand Manan Island, July 31, 1891, *J. R. Churchill.* MAINE: wooded crests of sea-cliffs, eastern side of Moose Island, Passamaquoddy Bay, August 16, 1909, *Fernald*, no. 2122; clay, gravel or humus, West Quoddy Head, Lubec, July 26 and August 2, 1909, *Fernald*, nos. 2120, 2121; in humus, Cutler, July 30, 1901, *G. G. Kennedy*, July 1–6, 1902, *Kennedy, Williams, Collins & Fernald*, July 12, 1902, *Kate Furbish*, August 27, 1902, *Fernald;* edge of sandy bluffs bordering ocean, Beal's Island, Jonesport, August 5, 1907, *Cushman & Sanford*, no. 1492; grassland and pastures, Great Cranberry Island, July 17, 1896, *E. L. Rand*, July 17, 1897 and July 20, 1899, *E. F. Williams & E. L. Rand;* grassy places, Great Duck Island, July 12, 1901, *E. L. Rand;* Baker Island, July 22, 1899, *E. L. Rand;* seawall, Southwest Harbor, July 26, 1892, *E. L. Rand;* East Brothers Island, July 31, 1904, *A. H. Norton;* North Libby Island, August 2, 1904, *A. H. Norton.*

3c. E. PURPUREA, var. RANDII, forma **albiflora**, n. f., corollae lobis albicantibus.

Lobes of the corolla whitish.— Eastern Newfoundland, Magdalen Islands and the coast of Maine from Penobscot Bay westward. NEWFOUNDLAND: border of salt marsh, Killigrew's, August 3, 1911, *Fernald & Wiegand*, no. 6164; crests of sea-cliffs, Western Head, New World Island, July 20, 1911, *Fernald, Wiegand & Bartram*, no. 6163. MAGDALEN ISLANDS: dry knolls, Brion Island, August 5, 1914, *St. John*, no. 1641. MAINE: turfy crests, Elwell Point, South

Thomaston, August 15, 1913, *Bissell, Fernald & Chamberlain* (*Fernald*, no. 10,404, TYPE in Gray Herb.); Dix Island (near Owl's Head), September, 1903, *Sheridan Plaisted;* Wooden Ball Island, August 24, 1905, *A. H. Norton.*

3d. E. PURPUREA, var. **Farlowii** (Robinson), n. comb. *E. Randii*, var. (?) *Farlowii* Robinson, RHODORA, iii. 274 (1901); Robinson & Fernald in Gray, Man. ed. 7, 733 (1908); Eames, RHODORA, xi. 98 (1909); Fernald & Wiegand, RHODORA, xii. 105 and 143 (1910).— Usually smaller than typical *E. purpurea* or var. *Randii*, 1–13 cm. high: leaves and bracts densely pubescent, mostly smaller, 2–7 mm. long, the flowers therefore appearing more conspicuous: corolla whitish; the lower lip somewhat more spreading; yellow spot in the throat smaller or wanting.— Exposed turfy crests or gravelly or sandy shores, Newfoundland and eastern Quebec to the eastern coast of Maine. NEWFOUNDLAND: top of dry sea-bluffs, Torbay, August 21–26, 1901, *Howe & Lang*, no. 1455; rocks by the sea, Placentia, July 20, 1911, *C. S. Williamson*, no. 490; Barred Islands, Notre Dame Bay, August 12, 1903, *J. D. Sornborger;* damp sand on pebbly tidal beach, Bay St. George, August 12, 1908, *Eames & Godfrey*, nos. 8066, 8067; damp sands, carboniferous area, Stephenville Crossing, August 14, 1910, *Fernald, Wiegand & Kittredge*, no. 3990. QUEBEC: grassy or mossy ledges, Isle Netagamiou, Archipelago of Petit Mécatina, Saguenay County, August 22 and 23 (form with purplish upper lip), 1915, *St. John.* MAGDALEN ISLANDS: dry knolls and sandy headlands, Brion Island, August 5 and 10, 1914, *St. John*, nos. 1642, 1647; dry turfy crests of a sandstone sea-cliff, southwest of Étang du Nord village, Grindstone Island, August 15, 1912, *Fernald, Long & St. John*, no. 8023. PRINCE EDWARD ISLAND: in grass, East Point, August 15, 1888, *J. Macoun*, Herb. Geol. Surv. Can., no. 17,439, in part. NOVA SCOTIA: on rocks, Englishtown, Cape Breton, August 2, 1898, *J. Macoun*, Herb. Geol. Surv. Can., no. 19,897; sea-cliffs, Neil's Harbor, July 28, 1909, *J. R. Churchill.* MAINE: open thin humus, Dog Island, Eastport, September, 1877, *W. G. Farlow*, August 3, 1909, *Fernald*, no. 2124; humus, West Quoddy Head, Lubec, July 26, 1909, *Fernald*, no. 2123; Jonesport, September 17, 1886, *N. T. Kidder.*

Fernald & Wiegand's no. 3991 from damp sand at Stephenville Crossing, Newfoundland, growing with no. 3990, is apparently this variety, though the flowers are larger (4 mm. long) and the fresh foliage had a characteristic lustrous bronze appearance which was very striking.

3e. E. PURPUREA, var. FARLOWII, forma **iodantha**, n. f., corollae lobis purpureis.

Lobes of the corolla purple.— MAINE: Matinicus Island, August 22, 1905, *A. H. Norton* (TYPE in Gray Herb.).

In its very small thick and densely pubescent leaves quite like var.

Farlowii, but with the deep-purple corolla of the glabrous *E. purpurea* and the sparingly pubescent var. *Randii*.

Euphrasia purpurea is our most variable species, in its more pronounced trends appearing like a number of species but without distinct concomitant characters. The characteristic purple corolla of typical *E. purpurea* and var. *Randii* is ordinarily a good character, but white-flowered forms of each are now known, thus breaking down a line of demarkation which was formerly used in distinguishing the very densely pubescent white-flowered var. *Farlowii*. The diagnostic value of the color of the corolla is now further put in doubt by the discovery by Mr. Norton of the Matinicus plant which in every other character matches extreme white-flowered var. *Farlowii* but which has the purple corolla of true *E. purpurea*. These extremes, although pronounced in the majority of colonies are, then, better treated as variants of one highly diversified species. It is noteworthy that true *E. purpurea* has its great development about the Gulf of St. Lawrence, where var. *Randii* is rare, and that it does not reach the Maine coast, where the latter is common; also that var. *Farlowii* is most abundant in Newfoundland, the Magdalen Islands and the Maritime Provinces but rare on the Maine coast.

4. E. MOLLIS (Ledeb.) Wettstein, Monog. d. Gatt. Euphrasia, 141, t. 4, fig. 205–210 and t. 12, fig. 5 (1896); Robinson, RHODORA, iii. 271 (1901). *E. officinalis*, var. *mollis* Ledeb. Fl. Ross. iii. 263 (1849).— Plant 4–10 cm. high, simple or occasionally with a pair of short spreading branches: leaves large for the size of the plant, 8–15 mm. long, ovate, coarsely crenate-dentate, copiously pubescent: inflorescence when young almost capitate, in maturity with the 1–3 lower pairs of bracts remote: bracts resembling the leaves: calyx densely pilose; its teeth barely acute: corolla scarcely overtopping the bracts, 5–6 mm. long, resembling that of *E. disjuncta* but deeper purple.— Grassy and sandy banks, Alaska, Islands of Bering Sea, and Kamtschatka. ALASKA: hillside, Akutan Island, August 21, 1907, *E. C. Van Dyke*, no. 95; other stations cited by Wettstein.

Very closely related to *E. disjuncta* and *E. arctica*, from both of which it differs in the more congested inflorescence, more copious pubescence, more rounded bracteal teeth, and more purple corolla. From *E. arctica* it also differs in its smaller corolla.

5. E. **disjuncta**, n. sp. *E. officinalis*, β Hook. Fl. Bor.-Am. ii. 106 (1838). *E. latifolia* Robinson, RHODORA, iii. 274 (1901), in part, perhaps also of Pursh in part. *E. hirtella* Robinson, l. c. 275 (1901), in part, not Jordan. *E. arctica* Robinson & Fernald in Gray, Man. ed.

7, 733 (1908); Britton & Brown, Ill. Fl. ed. 2, 217 (1913); in part, not Lange.— Gracilis 6–30 cm. alta simplex vel sub medio plus minusve ramosa, ramis plerumque arcte adscendentibus puberulis; foliis plerumque 9–16-jugis ovatis vel orbicularibus 8–18 mm. longis grosse crenato-dentatis sparse pubescentibus subremotis, internodiis plerumque 3 rare 7 cm. longis; spicis interruptis deinde perlongis; eis primariis maturis 0.5–2.7 dm. longis; bracteis 5–20-jugis remotis grandis patentibus vix reductis, dentibus grossis acutis; corollis 4–5.5(–6) mm. longis oculis luteis; labio superiore purpureo-tincto paullo 2-lobato, lobis paullo truncatis undulatis vel denticulatis semi-reflexis vix revolutis; labio inferiore albido purpureo-lineolato patente vix flabelliforme, lobis oblongis emarginatis; capsulis 4–5 mm. longis calycis dentibus peracutis vix aristatis aequantibus paullo pubescentibus retusisque.

Slender, 6–30 cm. high, simple or more or less branched below the middle; branches slender, usually strongly ascending, puberulent: leaves 9–16 pairs, or in dwarfed plants fewer, ovate or orbicular, 8–18 mm. long, coarsely crenate-dentate, sparingly pubescent, somewhat remote; the internodes mostly 3 (rarely to 7) cm. long, in dwarf plants shorter: spikes interrupted, becoming very long, the primary mature ones 0.5–2.7 dm. long: bracts 5–20 pairs, remote, large, spreading, scarcely reduced, with coarse acute teeth: corolla 4–5.5(–6) mm. long, with a yellow eye; upper lip tinged with purple, slightly 2-lobed, the lobes a little truncate, undulate or denticulate, semi-reflexed but scarcely revolute; lower lip white with purple lines, spreading but scarcely fan-shaped, the oblong lobes notched: capsule 4–5 mm. long, equaling the very acute but not aristate calyx-teeth, slightly pubescent, barely retuse.— Damp open places, Labrador and Newfoundland to northern Maine, Alberta, Mackenzie and Alaska. LABRADOR: 20 miles north of Nachvak, August 28, 1908, *H. S. Forbes;* crevices of rock, Nachvak, July 29, 1884, *R. Bell;* Flint Island, near Port Manvers, August 22, 1908, *Owen Bryant;* Hopedale, August 11, 1891, *Bowdoin College Expedition,* no. 242; rocky places, Battle Harbor, August, 1911, *C. S. Williamson;* springy banks and damp hillsides, Forteau, July 30, 1910, *Fernald, Wiegand & Kittredge,* no. 3994; on the gneiss plain in damp soil, Blanc Sablon, July 31 and September 3, 1910, *Fernald & Wiegand,* nos. 3987, 4012. NEWFOUNDLAND: grassy slopes near shore, Black Island, Notre Dame Bay, July 20, 1911, *Fernald, Wiegand & Bartram,* no. 6165; ledges, talus and gravel, north bank of Exploits River below the falls, Bishop Falls, July 28, 1911, and Grand Falls, July 22 and August 12, 1911, *Fernald, Wiegand & Darlington,* nos. 6166, 6167, 6168, and 6169 (TYPE in Gray Herb.); granitic ledges and gravel along a brook, Quarry, August 23, 1911, *Fernald & Wiegand,* no. 6170; gravel along Kitty's Brook, August 25, 1911, *Fernald & Wiegand,* no. 6171; grassy strand of Ingornachoix Bay, August 2, 1910, *Fernald, Wiegand & Kittredge,* no. 3986; calcareous rocks and talus, entrance to Port Saunders

Harbor, August 1, 1910, *Fernald, Wiegand & Kittredge,* no. 3993; grassy fields overlying conglomerate limestones and calcareous sandstones, Cow Head, July 22, 1910, *Fernald & Wiegand,* no. 3983; barrens at base of the serpentine tablelands, Bonne Bay, August 27, 1910, *Fernald & Wiegand,* no. 4005; Southeast Arm, Bonne Bay, August 31, 1910, *Fernald & Wiegand,* no. 4011; heath on diorite tableland, altitude about 380 m., "Lookout Mountain," Bonne Bay, August 26, 1910, *Fernald & Wiegand,* no. 4010; low thicket on coast, Bay of Islands, August 6, 1908, *Eames & Godfrey,* no. 8071; park-like openings in damp woods and in open peat bogs back of Curling (Birchy Cove), July 5–August 10, 1910, *Fernald, Wiegand & Kittredge,* nos. 3979, 3980, 3982; moist grassy places on highest peak at about 650 m. altitude, Blomidon, July 31, 1908, *Eames & Godfrey,* no. 8072; diorite tableland, altitude about 550 m., Blomidon, August 22, 1910, *Fernald & Wiegand,* no. 4004; springy banks along Harry's River, August 18, 1910, *Fernald & Wiegand,* no. 4008; dry limestone barrens and in wet runs and boggy spots, upper slopes and tablelands, altitude 200–300 m., also in mossy spruce woods on slope, Table Mountain, Port à Port, August 16, 1910, *Fernald & Wiegand,* nos. 3997, 3999, 4000. Quebec: Esquimaux River, lat. 51° 59′, July 27, 1882, *J. A. Allen,* no. 69; grassy shores, Vieux-Fort, Canton Pontchartrain, St. Paul, Canton Chevalier, and Bradore, Canton Brest, Saguenay County, July 25, 26 and 29, 1915, *St. John.* New Brunswick: mountain slopes, Gloucester County, 1867, *J. Fowler,* Herb. Geol. Surv. Can., no. 17,445. Maine: St. John River, *G. L. Goodale.* Alberta: Rocky Mountains, *Drummond;* in boggy spots, altitude 2530 m., mountains north of Devil's Lake, August 18, 1891, *J. Macoun,* Herb. Geol. Surv. Can., no. 17,446. Mackenzie: grassy places, Lewes River, lat. 62°, August 20, 1887, *Dawson,* Herb. Geol. Surv. Can., no. 17,449. Alaska: mouth of Chilkat River, lat. 59°, 1883, *F. Meehan;* Dalton Landing, vicinity of Yakutat Bay, August 15, 1892, *Frederick Funston,* no. 125; Kadiak Island (Gray Herb.); Shumagin Islands, 1871–72, *M. W. Harrington;* grassy slopes, St. Paul's Island, August 3, 1891, *J. M. Macoun.*

The flowers of *E. disjuncta* are smaller than those of any other species in the group which has the lobes of the upper lip strongly reflexed. The pubescent leaves and bracts, the small flowers, open inflorescence, and large spreading bracts with merely acute teeth are the chief characteristics.

6. E. arctica Lange in Rostrup, Bot. Tidskr. iv. 47 (1870); Robinson & Fernald in Gray, Man. ed. 7, 733 (1908), in large part; Britton & Brown, Ill. Fl. ed. 2, 217, fig. 3840 (1913), in large part. *E. latifolia* Pursh Fl. Am. Sept. ii. 430 (1814), as to Labrador plant; Wettstein, Monog. d. Gatt. Euphrasia, 136 (1896); Britton & Brown, Ill. Fl. iii. 182, fig. 3325 (1898); Robinson, Rhodora, iii. 274 (1901);

in part not *E. latifolia* L. (1753). *E. officinalis*, β. *latifolia* Lange, Overs. ov. Grönl. Flora, 79 (1880), as to plant. *E. officinalis*, β *tatarica* Benth. in DC. Prodr. x. 552 (1846), in part, not *E. tatarica* Fischer (1825). *E. officinalis*, γ *alpestris* b. *arctica* Herder, Bull. Soc imp. nat. Mosc. 1884, pars. 3, 46. *E. officinalis*, var. *hyperborea* Favr. acc. to Wettstein, l. c. (1896). *E. hirtella* Robinson, Rhodora, iii. 275 (1901), in large part, not Jordan.— Plant 5–25 cm. high, slender: stem pubescent: branches few, rarely many, from the middle of the stem or below, usually strongly ascending; internodes mostly 8–15 mm. long: leaves 5–15 mm. long, mostly rather small, from copiously to sparingly pubescent: inflorescence dense, uninterrupted above (except in "drawn" plants), the mature primary spikes 3–15 cm. long: bracts 7–20 pairs, usually rather small, ascending and often imbricated, the lowest in maturity 0.5–2 cm. apart; teeth acute: corolla white with pale lavender lines and often darker upper lip, 5–7 mm. long, exceeding the bracts; lobes of the lower lip nearly parallel.— In dry or rarely damp, often calcareous, soils, mountains of northern Europe, Iceland and Greenland, south to Newfoundland, eastern Quebec, Michigan and Minnesota. Labrador: Kangalaksiorvik Bay, September 1–10, 1908, *Owen Bryant;* Nachvak, September 4, 1900, *E. B. Delabarre;* Rama, July–August, 1899, *A. Stecker*, no. 343; Hopedale, August 4–6, 1897, *J. D. Sornborger*, no. 82; Indian Harbor, Hamilton Inlet, August 2, 1891, *Bowdoin College Expedition*, no. 193. Newfoundland: dry limestone barrens, upper slopes and tablelands, altitude 200–300 m., Table Mountain, Port à Port Bay, August 16, 1910, *Fernald, Wiegand & Kittredge*, no. 4001; Quebec: grassy ledge, Isle Netagamiou, Archipelago of Petit Mécatina, Saguenay County, August 22, 1915, *St. John;* damp gravelly places, Jupiter River, Anticosti, August 27, 1883, *J. Macoun*, Herb. Geol. Surv. Can., no. 17,441; cliff-shores of Gaspé Bay, Douglastown, August 22, 1904, *Collins, Fernald & Pease;* Bonaventure conglomerate (calcareous) sea-cliffs, Bonaventure Island, August 7 and 8, 1907, *Fernald & Collins*, no. 1166; summit of Mt. Ste. Anne, Percé, August 18, 1904, *Collins, Fernald & Pease;* everywhere in dry open soil and sterile turfy places, mouth of Grand River, Gaspé County, August 11–15, 1904, *Collins, Fernald & Pease;* damp mossy and grassy slope, Pointe Nouvelle, Hope Township, July 30, 1902, *Williams & Fernald;* gravelly beach at Paspébiac Lighthouse, July 27 and 29, 1912, *Williams & Fernald;* wet red-sandstone bluffs and steep slopes between Baldé and the Baie des Chaleurs, Bonaventure River, August 5, 6 and 8, 1904, *Collins, Fernald & Pease.* Ungava: Fort George, July 17, 1899, *A. P. Low*, Herb. Geol. Surv. Can., no. 62,569. Ontario: mouth of Albany River, July 25, 1904, *W. Spreadborough*, Herb. Geol. Surv. Can., no. 62,568; north shore of Lake Superior, 1848, *Agassiz;* Lake Superior, 1879 *T. S. Roberts.* Michigan: Isle Royale, 1849, *Whitney*, July 30, 1909 *W. S. Cooper*, no. 76. Minnesota: Good Harbor, August 14,

1868, *H. Gillman*. Keewatin: Churchill, lat. 58° 50′, July 29 and August 3, 1910, *J. M. Macoun*, Herb. Geol. Surv. Can., nos. 79,380, 79,381.

Intermediate between *E. disjuncta* and *E. stricta*, var. *tatarica*. Extremes are difficult to distinguish from those plants. From the former *E. arctica* differs in the shorter internodes, denser inflorescence with more ascending bracts, more acute bracteal teeth, and slightly larger corolla. From the latter it may be distinguished by the less subulate bracteal teeth and smaller corolla with paler lines and with less spreading lobes of the lower lip.

Wettstein took up for this boreal species the name *E. latifolia* Pursh, not L. (or, as Pursh said, Willdenow), because the Linnean (and Willdenowian) *E. latifolia* does not belong to the genus *Euphrasia* as now interpreted and because the Labrador plant seen by Pursh *was* a true *Euphrasia* (the plant here treated as *E. arctica*). It is clear, however, from Pursh's treatment that he had no intention of publishing a new species but merely copied literally from Willdenow the description of the Linnean *E. latifolia* of the Mediterranean region, a plant belonging in the genus *Parentucellia*.

7. E. **hudsoniana**, n. sp. Planta 5–22 cm. alta; caulibus pubescentibus simplicibus vel inferne sparse ramosis, ramis longis valde adscendentibus, internodiis inferioribus 1.5–4 cm. longis; foliis oblongis 15 mm. longis sparse pubescentibus, dentibus paucis acutis; spicis longis, eis primariis in maturitate 0.5–1.5 dm. longis, internodiis inferioribus 1–3 cm. longis; bracteis 5–15-jugis grandis oblongis 7–15 mm. longis adscendentibus grosse acutissimeque serratis, dentibus aristatis; corolla 5.5–6 mm. longis albidis violaceo-lineolatis; labio superiore purpureo-tincto bilobato, lobis semireflexis; labii inferiori lobis vix divergentibus.

Plant 5–22 cm. high; stem pubescent, simple or sparingly branched below; branches long, strongly ascending; lower internodes 1.5–4 cm. long: leaves oblong, 15 mm. long in the larger plants, sparingly pubescent, with a few very coarse acute teeth: spikes rather long; the primary ones in maturity 0.5–1.5 dm. long, with the lowest internodes 1–3 cm. apart: bracts 5–15 pairs, large, oblong, 7–15 mm. long, ascending, coarsely and very sharply aristate-toothed: corolla 5.5–6 mm. long, whitish with pale violet lines; upper lip suffused with purple, bilobed, the lobes semi-reflexed; lower lip with the lobes scarcely divergent.— Grassy places about Hudson Bay; little known. Ungava: Koaksoak River, August, 1896, *Spreadborough* (type in Gray Herb.); duplicate types in Herb. Geol. Surv. Can., nos. 14,472 & 62,237. British North West America: specimen coll. *Franklin Expedition; King* in Back's Voyage. Macoun's material (Herb.

Geol. Surv. Can., no. 17,448) from Bow River Pass, Alberta, is overripe but has similar bracts.

Similar to *E. canadensis* but with pubescent leaves and bracts, the latter oblong and usually more ascending and larger than in *E. canadensis*. In outline of foliage suggesting the European *E. salisburgensis* Funck, which, however, has the leaves and bracts pectinate, the spike denser, and the lower internodes rarely 1 cm. long.

8 E. CANADENSIS Townsend, Journ. Bot. xxxvi. 1, t. 381 (1898); Robinson & Fernald in Gray, Man. ed. 7, 733 (1908). *E. officinalis* Michx. Fl. Bor.-Am. ii. 16 (1803); Pursh, Fl. ii. 430 (1814); Pringle, Bull. Torr. Bot. Cl. vi. 366 (1879); *J. I. & A. B. Northrop*, Bull. Torr. Bot. Cl. xvii. 27 (1890), in part; not L. *E. americana*, var. *canadensis* Robinson, RHODORA, iii. 276 (1901).— Plant rather low, 0.5–2.5 dm. high, simple or more or less bushy-branched from below the middle; branches mostly arcuate-ascending; internodes short: leaves of medium size, the primary 0.5–1 cm. long, glabrous, the teeth acute or obtuse: spikes very elongate, dense above, the primary one nearly the full height of the plant: bracts spreading, rarely at all imbricated above, with bristle-tipped teeth, the lowest in maturity 0.3–1.5 (rarely –2.5) cm. apart: corolla 5–6.5 mm. long, white with lavender or bluish veins and with a violet tinge on the upper lip; upper lip 2-lobed, the lobes half-reflexed, truncate and shallowly toothed; lower lip only slightly fan-shaped.— Open barren fields and turfy roadsides, mostly about settlements, Quebec, the Maritime Provinces and northern New England. QUEBEC: open ground, very common, Rivière Blanche, August 8, 1904, *F. F. Forbes;* Little Métis, August 1, 1906 and August 22, 1907, *J. Fowler;* common in open sterile soil, New Richmond, July 28-August 1, 1904, *Collins, Fernald & Pease;* open damp spots, Carleton, July 23, 24 and 27, 1904, *Collins, Fernald & Pease;* turfy spots and open pastures, Bic, July 16 and 18, 1904 and July 27, 1907, *Fernald & Collins;* crevices of rock, damp hollows, etc., Rivière du Loup, August 2, 1902, *Williams & Fernald;* fields, Temiscouata, July 26, 1878, "probably introduced from Europe," *C. G. Pringle;* Tadousac, August 5, 1902, *E. F. Williams*, October, 1909 *Emily F. Fletcher;* St. Alphonse, Ha Ha Bay, August 5, 1902, *E. F. Williams;* near Ouatchouan Falls, Lake St. John, August 29, 1904, *W. F. Wight*, no. 224; old fields, Cap à l'Aigle, July, August, 1905, *J. Macoun*, Herb. Geol. Surv. Can., nos. 67,825, 67,826; Quebec, July 21, 1792, *Michaux* (herb. Michx.), *Houghton, Jos. Blake*, et al.; fields, roadsides, and in serpentine and soapstone gravels, East Broughton, August 23, 1915, *M. L. Fernald & H. B. Jackson;* open pasture and wet ground, Georgeville, July 10 and 23, 1902, *J. R. Churchill.* PRINCE EDWARD ISLAND: Malpeque, July 20, 1904, *J. Fowler.* NOVA SCOTIA: L'Ardoire, Cape Breton, August 1, 1892, *Walter Faxon;* Barrington Passage, July 9, 1910, *J. Macoun*, Herb. Geol. Surv. Can., no. 80,657. NEW BRUNSWICK: Shediac, August 5,

1904, *J. Fowler;* Campbellton, July 1, 1877, *R. Chalmers*, Herb. Geol. Surv. Can., no. 17,447. Maine: barren fields about Boundary Lake, August 12, 1902, *Eggleston & Fernald;* dry open places, Frenchville, August 12, 1901, *Williams, Robinson & Fernald*, Pl. Exsicc. Gray., no. 62; dry field, Hamlin, September 18, 1896, *Fernald;* Monhegan Island, 1901, *C. F. Jenney*, 1902, *F. Grace Smith*, no. 77. New Hampshire: at north door of Glen House, July 28, 1865, *Wm. Boott;* roadside, base of Mt. Washington, August 10, 1878, *J. A. Allen;* damp mossy places on side of road about $1\frac{1}{2}$ miles from Glen House toward Jackson, August 9, 1902, *F. F. Forbes;* roadside $\frac{1}{2}$ mile south of Glen House, September 5, 1908, *A. S. Pease*, no. 11,550; lawn of Glen House, August 2, 1907, *A. S. Pease*, no. 10761; road between Glen House and Tuckerman's Ravine, August 19, 1903, *A. H. Moore*, no. 1424.

E. canadensis is closely related to *E. arctica* and *E. stricta.* From the former it differs in the glabrous foliage and more aristate bracteal teeth; from the latter in the smaller corolla with paler veins and less spreading lateral lobes of the lower lip, and the usually lower stature, with more basal branching and more spreading bracts. It is found in fields, by roadsides and in other somewhat artificial habitats in the neighborhood of settlements and has every appearance of an introduced plant. Pringle, when he collected it in Temiscouata County, Quebec, in 1878, wrote of it, "doubtless introduced from Europe" (Bull. Torr. Bot. Cl. vi. 366). Nevertheless, as pointed out by Townsend, the plant does not exactly match any European species; and although strongly inclined to believe the species a recent introduction in Quebec and northern New England, we have sought in vain for an exact match for it in the Old World species. Its nearest affinity is apparently with *E. nemorosa* Pers., but it usually begins flowering from nearer the base and its branches are more confined to the base than in the European *E. nemorosa.* *E. canadensis* is usually lower than *E. nemorosa* and has rather larger leaves and bracts. In this connection it is significant that the plant was collected by Michaux at Quebec in 1792, the material in his herbarium being quite typical *E. canadensis.* Townsend, in publishing the species, said: "As to the history of *E. canadensis*, it is difficult to form an opinion without further knowledge of its present geographical distribution; whether it be an importation from Europe at a remote though historic period, modified by climatic or other influences, or whether it be the descendant of an ancient but indigenous form. As regards *E. americana* Wetts., Prof. Wettstein inclines to the idea of importation, as stated in his Monograph, p. 128."

The three species, *E. canadensis*, *E. americana*, and *E. stricta*, form, with the local and very distinct *E. hudsoniana* of Ungava, a group of species quite unlike our other large-flowered Euphrasias in the bristle-tipped teeth of the bracts, in this character being like several of the common European plants. *E. stricta* and its var. *tatarica* are European and possibly introduced in America, though the variety seems like an indigenous plant. It is possible, then, that *E. canadensis* and *E. americana* are derivatives of *E. nemorosa* and of *E. stricta* (doubtfully indigenous in America) or of some closely related European species introduced into eastern Canada and eastern Maine by the earliest European colonists, in the 16th or 17th centuries; and, being annuals, the plants have, during hundreds of generations, departed sufficiently from their ancestors now to stand as true American species. (See also notes under *E. stricta* and *E. americana*).

The Monhegan Island material referred here is not in satisfactory condition and further collections may show it to belong, rather, to *E. stricta*.

9. E. STRICTA Host, Fl. Austr. ii. 185 (1831); Wettstein, Monogr. d. Gatt. Euphrasia, 93 (1896), which see for detailed synonymy. *E. borealis* Fernald, RHODORA, ix. 163 (1907) and x. 201 (1908), not (Towns.) Wettst.— Plant 0.5–3 dm. high, usually rather strict, with a few short ascending branches mostly from near the middle of the stem, occasionally bushy-branched; internodes rather short, 1–2 cm. long: leaves small, the primary ones 3–10 mm. long, glabrous, few-toothed; the teeth coarse, acute: spikes long, dense and rather slender, the primary becoming 0.4–2.5 dm. long: bracts 10–30 pairs, glabrous, small, ascending, the upper imbricated, the lowest rarely more than 1 cm. apart; teeth very sharp, bristle-tipped: corolla large, 6–8 mm. long, exceeding the bracts, pale with deep-violet lines; upper lip more purplish, bilobed, each lobe semi-reflexed, truncate and denticulate; lower lip fan-shaped, the lateral lobes wide-spreading.— Dry fields and sterile grasslands, Newfoundland to Maine and northern New York; also Europe. NEWFOUNDLAND: fields, St. John's, July 31, 1894, *Robinson & Schrenk*, no. 102; damp soil, Torbay, August, 1901, *Howe & Lang*, no. 1450. QUEBEC: damp hollow, near mouth of Grand River, Gaspé County, August 11–15, 1904, *Collins, Fernald & Pease;* dry calcareous soil, Les Murailles, Percé, August 17, 1904, *Collins, Fernald & Pease;* sandy grassland, New Carlisle, July 28, 1902, *Williams & Fernald;* gravelly soil, Giroux, July 26, 1902, *Williams & Fernald*. PRINCE EDWARD ISLAND: grassy roadsides near Cozen's Pond, August 29, 1912, *Fernald, Long & St. John*, no. 8027. NEW BRUNSWICK: Campbellton, August 29, 1905, *J. Fowler;* pasture, Miscou Harbor, August 26, 1913, *S. F. Blake*, no. 5543a.

Nova Scotia: Commeauville, August, 1900, *L. L. Dame;* La Have River, August 6, 1910, *J. Macoun*, Herb. Geol. Surv. Can., no. 80,660. Maine: Machiasport, August, 1898, *M. A. Barber;* South West Harbor, August 30, 1890, *E. L. Rand*, September 19, 1892, *Fernald;* fields, Great Cranberry Isle, August 5, 1890, *J. H. Redfield*, 1897–98, *E. L. Rand;* Baker's Island, July 22, 1901, *Rand;* South Duck Island, August 9, 1893, *Redfield;* fields and roadsides, Sunshine, Deer Isle, August 26, 1912, *A. F. Hill*, no. 294; Swan Island, August, 1910, *Kate Furbish;* clearings and fields, Dark Harbor, Islesboro, August 14, 1913, *Woodward, Bissell & Fernald;* roadside, Clinton, August 13, 1911, *R. C. Bean;* roadsides and dry grassy door-yard, Bayville, August 30, 1911, *F. O. Grover;* Portland Road, Brunswick, August 26, 1913, *Kate Furbish.* New York: pasture, Waddington, August 29, 1914, *Orra Parker Phelps*, no. 95.

Similar, in the long spikes extending nearly to the base of the plant, to *E. canadensis*, but the branches fewer and less basal and the corolla slightly larger, with darker lines and with wide-spreading lobes of the lower lip; and the bracts less spreading and with slightly sharper teeth. The collections of *E. stricta* are all of recent date and the habitats so generally are fields, roadsides, lawns, and other situations associated with civilization that it seems that *E. stricta* has been recently introduced from Europe. In Maine it is spreading rapidly and in recent years has extended into well known areas where it is reasonably certain that it formerly did not occur.

9a. E. stricta, var. **tatarica** (Fischer), n. comb. *E. tatarica* Fischer in Spreng. Syst. Veg. ii. 777 (1825); Wettstein, Monogr. d. Gatt. Euphrasia, 88 (1896), which see for detailed synonymy. *E. officinalis, β. tatarica* Benth. in DC. Prodr. x. 552 (1846), in part.— Resembling *E. stricta* in habit, etc., but with the leaves and bracts pubescent and the bracteal teeth not so sharp.— Apparently confined to gravelly slopes or cliffs in the maritime district of Gaspé, Saguenay Counties, Quebec; Eurasia. Quebec: grassy shore, Natashquan, Saguenay County, September 6, 1915, *St. John;* grassy shore, Betchouane, Seigniory of Mingan, Saguenay County, September 9, 1915, *St. John;* dry calcareous soil, detritus or thin turf, summits and slopes, abundant at Percé, August, 1904, *Collins, Fernald & Pease;* Mont Rouge, Percé, July 23, 1905, *Williams, Collins & Fernald;* cliff-shores of Gaspé Bay, Douglastown, August 22, 1904, *Collins, Fernald & Pease;* dry open soil, mouth of Grand River, August 11–15, 1904, *Collins, Fernald & Pease.*

Possibly introduced, but seeming like an indigenous plant.

10. E. americana Wettstein, Monogr. d. Gatt. Euphrasia, 127 (1896) and Bot. Gaz. xxii. 401 (1896); Britton & Brown, Ill. Fl. iii. 182, fig. 3326 (1898); Robinson, Rhodora, iii. 275 (1901); Kennedy,

Rhodora, iv. 26 (1902); Moulton, ibid. 189 (1902); Robinson & Fernald in Gray, Man. ed. 7, 733 (1908); Cushman, Rhodora, xi. 13 (1909); Fernald & Wiegand, Rhodora, xii. 103, 143 (1910). *E. officinalis* Gray, Syn. Fl. ii. pt. 1, 305 (1878), in part; Redfield, Bull. Torr. Bot. Cl. xii. 103 (1885) and xiii. 232 (1886); Lawson, Bull. Torr. Bot. Cl. xiv. 10 (1887); Vroom, ibid. 12 (1887); Chickering, Bot. Gaz. xiii. 322 (1888), in part; not L.— Plant 1–4 dm. high, simple or more or less branched; branches long, spreading or arcuate-ascending: leaves ovate-oblong, glabrous, the primary 0.5–2 cm. long, coarsely toothed; teeth acute or obtuse: spikes rather short, except in full fruit, occupying the ends of the stems and branches, in maturity becoming 3–15 cm. long: bracts 5–18 pairs, glabrous, conspicuous, broadly ovate, more or less spreading, coarsely aristate-toothed, the lowest in maturity 0.5–2 cm. apart: flowers medium to large: corolla pale, 7–10 mm. long; upper lip tinged with purple, shallowly bilobed, the lobes partly reflexed, each 2–3-toothed; lower lip large, white with dark-purple lines, fan-shaped, the lateral lobes wide-spreading.— The commonest *Euphrasia* throughout southeastern Maine, the Maritime Provinces, and Newfoundland, rarely found far away from habitations. Newfoundland: fields and roadsides, Kil igrew's, August 3, 1911, *Fernald & Wiegand*, no. 6176; dry roadsides and pastures, Carbonear, August 6 and 7, 1911, *Fernald & Wiegand*, no. 6177; roadsides and dry clearings, Whitbourne, August 8, 1911, *Fernald & Wiegand*, no. 6178; Clarenville, July 18, 1902, *L. L. Dame;* Fogo Island, August 7, 1903, *J. D. Sornborger;* grassy shore of Dildo Run, New World Island, July 17, 1911, *Fernald, Wiegand & Bartram*, no. 6174; Glenwood, July 12 and 13, 1911, *Fernald, Wiegand & Darlington*, no. 6172; ledges, talus and gravel, north bank of Exploits River, below the falls, Bishop Falls, July 28, 1911, *Fernald, Wiegand & Darlington*, no. 6175; gravelly railroad bank near Rushy Pond, July 15, 1911, *Fernald, Wiegand & Bartram*, no. 6173; alluvium of brook, Quarry, August 23, 1911, *Fernald & Wiegand*, no. 6179; Grand Lake, July 25–August 15, 1906, *Owen Bryant;* grassy fields, Cow Head, July 23, 1910, *Fernald & Wiegand*, no. 3984; railway gravel near Bay of Islands station, July 18, 1910, *Fernald, Wiegand & Kittredge*, no. 3981; damp pastures, Birchy Cove (Curling), August 10, 1910, *Fernald, Wiegand & Kittredge*, no. 3989; open moist and grassy to dry and sterile places, Bay of Islands, August 10, 1908, *Eames & Godfrey*, no. 8063; fields, Doyle's, Great Codroy River, July, 1912, *J. R. Lunt;* field near coast, Channel, July 27–August 1, 1901, *Howe & Lang*, no. 789. Quebec: sterile soil, western end of Bonaventure Island, August 7 and 8, 1907, *Fernald & Collins*, no. 1165; fields and tops of sea-cliffs, Paspébiac, July 26, 1902, *Williams & Fernald;* sandy grassland, New Carlisle, July 28, 1902, *Williams & Fernald*. Magdalen Islands: dry sandy summit of Great Bird Rock, August 7, 1914, *St. John*, no. 1645; dry sandy headlands, Brion Island, August, 1914, *St. John*, nos. 1643, 1644;

open fields and recent clearings, Grindstone, Grindstone Island, July 22 and August 13, 1912, *Fernald, Long & St. John*, no. 8024, 8026. Prince Edward Island: dry sandy roadsides and fields, Tignish, August 6, 1912, *Fernald, Long & St. John*, no. 8025; Royalty Junction and Summerside, July, 1901, *J. R. Churchill;* among grass, East Point, August 15, 1888, *J. Macoun*, Herb. Geol. Surv. Can., no. 17,439; grassy places, Union Road, August, 1888, *J. Macoun*, Herb. Geol. Surv. Can., no. 17,444. Nova Scotia: McDonald's, Dingwall, Aspy Bay, July 14, 1909, *J. R. Churchill;* Sydney, July 17, 1902, *G. H. Morris;* common in grassland, Sydney, August, 1902, *Fernald;* Big Intervale, Cape Breton Island, July, 1898, *J. Macoun*, Herb. Geol. Surv. Can., no. 19,896; Barrington Passage, July, 1910, *J. Macoun*, Herb. Geol. Surv. Can., nos. 80,661, 80,664; Canso, August 2, 1901, *J. Fowler;* dry field, Sunny Brae, July 28, 1913, *St. John*, no. 1447; thin soil, Black Hole, near Baxter's Harbor, Scott's Bay, August 24, 1902, *Fernald;* sandy soil, Vault Road, North Mountain, near Sheffield's Mill, August 24, 1902, *Fernald;* dry soil, roadside, Windsor Junction, July 11, 1901, *Howe & Lang*, no. 433; Bridgewater, July, 1910, *J. Macoun*, Herb. Geol. Surv. Can., nos. 80,658, 80,659; rocks, Bell's Island, August 10, 1910, *J. Macoun*, Herb. Geol. Surv. Can. no. 80,662; Cape Sable Island, June 30, 1910, *J. Macoun* Herb. Geol. Surv. Can., no. 80,656. New Brunswick: thin grassland, Bathurst, July 23, 1902, *Williams & Fernald;* grassy roadside, Bathurst, August 13, 1913, *S. F. Blake*, no. 5368; sphagnum bog, Grande Anse, August 22, 1913, *Blake*, no. 5526; pasture, Miscou Harbor, August 26, 1913, *Blake*, no. 5543; St. John, *Wm. Boott* (August 8, 1873) *et al.;* St. Andrews, August, 1900, *J. Fowler;* Campobello Island, 1902, *W. G. Farlow;* Grand Manan Island, 1902, *W. G. Farlow.* Maine: open grassland, New Limerick, August 13, 1909, *Fernald*, no. 2114; slaty bank 1 mile above Oldtown, August 2, 1908, *Fernald;* gravelly open soil, Princeton, July 22, 1909, *Fernald*, no. 2117; Passamaquoddy Bay, August, 1892, *F. L. Harvey;* Moose Island, Passamaquoddy Bay, August, 1909, *Fernald*, nos. 2116, 2118, 2119; dry soil, Pleasant Point, Perry, August, 1909, *Fernald;* Cross Island, August, 1902, *Kate Furbish;* Cutler, August, 1902, *Kate Furbish;* roadside, Marshfield, July 8, 1902, *Fernald;* mossy roadside in woods between East Machias and Cutler, July 16, 1901, *G. G. Kennedy;* roadside, East Machias, July 23, 1910, *C. H. Knowlton;* Machias, August, 1888, *J. W. Chickering;* Black Island, July 20, 1894, *J. H. Redfield;* grassland, Great Cranberry Island, *Faxon & Rand* (1894) *et al.;* Sea Wall, Mt. Desert Island, 1891 and 1892, *Rand;* moist spots on roadsides, Brooklin, July 22, 1912, *A. F. Hill*, no. 234.

Wettstein's *Euphrasia americana* was a complex, consisting of the *E. officinalis* of Pursh's *Flora*, of specimens from St. John, New Brunswick (*Matthew*) and Quebec (*Canby*), and some material labeled "Flor. Am. bor." (Hooker). The *E. officinalis* of Pursh's *Flora* was

Michaux's plant from Quebec, which is *E. canadensis;* the Canby material from Quebec was presumably also *E. canadensis*, the common plant in the neighborhood of Quebec; but the St. John specimen, the first mentioned, therefore the type, and also the plant illustrated by Wettstein, is characteristic of the species here taken up as *E. americana.*

E. americana, like *E. canadensis* and *E. stricta*, has the appearance of an introduced plant, being extremely weed-like and inhabiting fields, pastures, roadsides and other artificial habitats in the neighborhood of civilization. The earliest collection seen by us was made by William Boott at St. John, New Brunswick, in 1873. Since then the species has been found in seemingly increasing abundance throughout the coastal districts of the Maritime Provinces, Newfoundland and Maine, closely following the progress of civilization into the interior of Newfoundland. In 1885, in making what seems to be the first clear record of the plant in Maine (though *E. stricta* may have been included), Redfield listed it among "recent introductions" (Bull. Torr. Bot. Cl. xii. 103) and in 1886 again wrote of it as "an introduced plant" (*ibid.* xiii. 232). But in 1887, Lawson, noting the wide distribution in Nova Scotia of the plant, said: "I know of no reason for regarding our common Canadian form otherwise than as indigenous" (Bull. Torr. Bot. Cl. xiv. 10) and at the same time (p. 12) Vroom, noting the plant about the ports of New Brunswick, said: "Though regarded here as a native, its being most frequent near the older settlements would seem to favor the opinion that it has been introduced." In publishing the species, Wettstein suggested the possibility of its being a modern derivative from the European *E. nemorosa;* but *E. americana* is at once distinguished by its larger flowers. Its affinity, it seems to us, is more with *E. stricta*, but ordinarily *E. americana* is readily separated from that species by the shorter spikes and more spreading bracts. From *E. canadensis* it is distinguished by its larger corollas with usually darker lines and its proportionally shorter spikes.

A New Form of Polygala polygama.— Polygala polygama Walt. forma **obovata**, n. forma. Folia caulina cuneate obovata supra medium latissima apice obtusa vel rotundata interdum cuspidulata basi cuneate angustata sessilia glaberrima margine vix revoluta

9–19 mm. longa 3–8 mm. lata; ea stolonum similia majora 1.5–2.3 cm. longa 6–9.5 mm. lata. Stem leaves wedge-obovate, broadest above the middle, obtuse or rounded at apex, sometimes cuspidulate, cuneately narrowed to the sessile base, glabrous, barely revolute on margin, 9–19 mm. long, 3–8 mm. broad; those of the stolons similar but larger, 1.5–2.3 cm. long, 6–9.5 mm. broad.

Florida: swampy places between Tallahassee and St. Marks, April–May, 1843, *Rugel* 106 (Brit. Mus.); Louisiana: New Orleans, 1832, *Drummond* 38 (type coll.: Brit. Mus.).

Rather strikingly different from the type in leaf-form, but in flower-characters identical, and scarcely worthy of more than formal rank. Rugel's number 106 represents in part a state of this forma answering to Chodat's var. *abortiva* of the typical form, which has been shown by Dr. Robinson (see Rhodora ii. 242 (1900)) to be merely an ordinary antumnal phase like that found in the genus *Viola*.—S. F. Blake, London, England.

REPORTS ON THE FLORA OF THE BOSTON DISTRICT,—XXI.

NYCTAGINACEAE.

OXYBAPHUS.

O. floribundus Chois. Ayer (*G. M. Allen*, Sept. 20, 1912; specimen in herb. Boston Soc. Nat. Hist.). Fugitive from the west.

O. nyctagineus (Michx.) Sweet. Roadsides and fields; Woburn, Cambridge, Dedham, Brockton, Duxbury. Very abundant and conspicuous at Duxbury. See Rhodora xiv. 20, 90, 1912. Introduced from the west.

ILLECEBRACEAE.

ANYCHIA.

A. canadensis (L.) BSP. Dry woods, frequent. Not reported from southeastern towns.

A. polygonoides Raf. Dry open places; Burlington, Danvers, W. Boston (dump, 1882), Hyde Park, W. Quincy (Blue Hills near Dome).

ILLECEBRUM.

I. VERTICILLATUM L. Well established in abandoned nursery, Reading (*C. C. Kingman*, specimen in herb. Gray). Native of Europe and N. Africa. See RHODORA xiv. 207, 1912.

PARONYCHIA.

P. argyrocoma (Michx.) Nutt., var. **albimontana** Fernald. Island in Merrimac River above Newburyport (*Dr. Karl Castelhun*, June, 1884). See Fernald, RHODORA viii. 101–104, 1906. Dr. Castelhun wrote to the Peabody Academy of Science under date of June 27, 1884: "The credit of finding *Paronychia* belongs to Mr. Ordway, who lives opposite the island. It grows on the rocks close to the shore at the upper end of the island. This location may indicate that the seeds drifted down river a few years ago, as people tell me it was not seen until two or three years ago. However, it seems to me it may have been overlooked."

SCLERANTHUS.

S. ANNUUS L. Gravel and sand, very common throughout.

AIZOACEAE.

MOLLUGO.

M. VERTICILLATA L. Dry sand and gravel, very common throughout.

C. H. KNOWLTON, WALTER DEANE } *Committee on Local Flora.*

THE TWENTY-FIRST ANNUAL MEETING OF THE JOSSELYN BOTANICAL SOCIETY OF MAINE was held at Waterville, August 10–14, 1915.

The excessive rain, continuing to the time of the meeting, was a discouraging feature, but with four days at Waterville, which were cool and pleasant, and an attendance of twenty members, the field work was satisfactory, except that the river shores, the bogs and low

grounds were inundated and failed to yield the characteristic flora. For this reason very few species of *Carex* or other sedges were seen.

Many of the interesting localities visited by members of the Society in 1898 were again examined and most of the species collected at the former meeting were found at the same stations, and in some instances in much greater abundance. Especially was this true of *Tofieldia glutinosa* of which only a single plant was found in 1898. It is now fairly plentiful together with *Rynchospora capillacea* var. *leviseta* and *Juncus alpinus* var. *insignis*.

Changes, however, have taken place along the Winslow shores of both the Kennebec and the Sebasticook rivers. The region known as "Beulah" is now a pasture and not at all the rich and attractive place that it was in former years.

Among the plants collected along the shore of the Kennebec may be mentioned *Rynchospora capillacea* var. *leviseta, Circaea intermedia, Juncus alpinus* var. *insignis, Tofieldia glutinosa, Solidago racemosa, Sporobolus Richardsonis;* new to the region, and plentiful. In woods were *Orchis spectabilis, Phegopteris hexagonoptera, Carex plantaginea, Dentaria diphylla, Dirca palustris* and *Caulophyllum*.

A public meeting was held on Wednesday evening in Coburn Classical Institute at which Prof. Webster Chester of Colby, in a very pleasing address, formally welcomed the Society to Waterville.

Mr. Frank S. Collins spoke on Marine Algae, illustrating his talk with an extensive series of finely prepared specimens; and Rev. A. B. Hervey told of collecting algae in Bermuda, with graphic descriptions of means and methods.

At a later meeting Mr. G. K. Merrill read a paper on Lichens, with especial reference to an important collection from Labrador.

The election of Officers resulted as follows:—

President, Mr. G. K. Merrill, Thomaston.
Vice-President, Mr. A. H. Norton, Portland.
Secretary, Dr. D. W. Fellows, Portland.
Treasurer, Mr. R. C. Bean, Clinton.

Committee of Arrangements,

Mr. G. K. Merrill, ex officio.
Dr. D. W. Fellows.
Mr. A. H. Norton.

The next meeting will be on the coast, probably in the neighborhood of Damariscotta.— D. W. Fellows, Secretary.

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Rhodora

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FLORAL CHANGES IN A SALT MARSH DURING RECLAMATION.

Walter Deane.

In 1908 a dam was constructed across Charles River near its mouth between Boston and Cambridge, Massachusetts. The object was to raise the water in the Basin above to a permanent level for civic improvement. The exclusion of salt water and tidal action, which followed this work, at once began to bring about the inevitable changes in the flora of the salt marshes along the banks of the river that had been within reach of the tides. For several years I have been much interested in studying these changes in a certain piece of marsh in Cambridge not far from my home.

I have collected specimens of every species of plant not including the lower cryptogams that I could find on many visits to the given area, and I feel confident that little, if anything, has escaped me. Of course a collection of this sort can never be complete, as additional species will doubtless come in every season, as long as the marsh is undisturbed. As the given area is under the control of the Metropolitan Park Commission, the land may be developed at any time, and it seems best to record now the result of my observations.

Before the building of the dam in question the tidal limits of Charles River were at a dam in Watertown, about eight miles above the new one, which is near the mouth of the river. Until the change was made the section of marsh under consideration was subjected to the usual tidal action. It was covered at the regular seasons by the high tides, and its surface was cut by innumerable ditches dug in the early days to drain the marsh. Except for the changes resulting

from the exclusion of the salt water and tidal wash, it is practically the same to-day as of old, the fact which affords its chief biological interest, most of the salt marsh bordering the river having been transformed for park, building and other purposes.

The marsh is on the left or west bank of the river and is well defined. It has approximately the form of a segment of a circle, the chord or straight side running north and south, directly east of Cambridge Cemetery and close to it, a bank some 20 or 25 feet high descending from the Cemetery to the marsh. This bank extends from the south end for some two-thirds of the distance, the remaining portion of the marsh being bordered by land several feet above the marsh and by a hill. The eastern portion of the marsh, forming the arc, borders on the river. The greatest length of the area is 2250 feet, or a little less than half a mile, while the greatest width is 800 feet or about one sixth of a mile.

It was in the fall of 1908 that the river was closed. To quote from the Sixth Annual Report of the Charles River Basin Commission, published December 1, 1908, "On Oct. 20, 1908, the eighty-two gates in the shut-off dam, described in the Commission's last report, were closed simultaneously. * * * * The Basin in the beginning had to be filled for the most part with salt water, the long drought having reduced the daily flow of the Charles River to so small an amount that to fill it with fresh water would have taken many days, whereas it was possible to fill the Basin in a few hours with water let in through the sluices. The permanent water level, established soon after the closing of the shut-off, is at the grade of 8 feet above Boston Base, and Boston Base is 0.64 of a foot below mean low-water mark. * * * * Seventeen and one-half miles of shore line have undergone a transformation which will render their further improvement a matter of small expense compared to the cost of their treatment." And again, "On the morning of October 20, forty-one men with axes were assigned to their stations on the frame from which the gates were suspended, and each man was instructed on a given signal to cut the ropes that held two gates, after which he was to come down, fasten the gates in place with wedges and see that each gate was completely closed. At 11 A. M. the signal was given and in two seconds all of the gates were down; in two minutes they were all wedged securely in place. * * * * A large plant immediately began the work of placing earth fill next the shut-off dam. Within a week the fill was well up to ordinary high

water, and before the next run of high tides the fill was made nearly complete. There has been no appreciable movement of the structure since the filling has been in progress."

Mr. Hiram Allen Miller, consulting engineer for the Commission, writes under date of June 5, 1913, "The permanent level of the Basin is at grade 8 and it rarely ever varies 2 or 3 inches above or below that elevation. There is no appreciable current in the year below the arsenal, except in case of heavy floods." The arsenal is at North Beacon Bridge referred to later. Mr. George Lyman Rogers, Secretary of the Commission, writes under date of May 16, 1913, "In answer to your inquiry relative to the freshness of the water in Charles River Basin opposite Cambridge Cemetery, I would say that an average of fifteen analyses made of the water in the Basin at Western Avenue Bridge in 1912 showed 32 parts chlorine in every 100,000 on the surface, and on the bottom 54 parts chlorine to 100,000. This is practically fresh water. The analyses at North Beacon Bridge made even a better showing," and Mr. John R. Rablin, engineer of the Commission, writes me on June 5, 1915, "The following table from the chemical examination of water in the Charles River Basin, taken at West Boston and North Beacon Street bridges in 1914, shows the number of parts in 100,000 of chlorine:

West Boston Bridge,	Surface,	July,	35.00;	Oct.	174.00
" " "	Bottom,	"	65.50	"	168.00
North Beacon St. Bridge,	Surface,	"	1.60	"	140.00
" " " "	Bottom,	"	1.50	"	143.00."

In regard to the discrepancy between these figures and those given me by Mr. Rogers, Mr. Rablin writes on June 22, 1915, "In reply to your inquiries of June 18, I would say that the information in regard to chlorine in the water of the Charles River Basin was probably from analyses taken at different seasons of the year, and if you could examine the records of all analyses you would find that the quantity varies from practically nothing in the spring to from 100 to 200 parts in 100,000 in the fall. This variation is due to the fact that the fresh water flow of the river during the winter flushes out the river and keeps it fresh until such time as the lack of fresh water from above allows the amount of salt water to increase." In the same letter he writes, "The salt water entering the Basin from the operation of the locks, being much heavier than the fresh water, is likely to affect

the water of practically the whole Basin, especially in dry seasons, but remains at the bottom of the river."

The center of the marsh in question is about 4.8 miles above the dam, 1.5 miles above Western Avenue Bridge, and 1.75 miles below North Beacon Bridge. West Boston Bridge is nearly half a mile above the dam. The surface of the marsh is from 3 to 5 feet above the level of the water, and is easily traversed. Innumerable ditches run east and west, some still open, others more or less closed, while still others are visible only by a slight depression on the surface. A ditch, interrupted here and there, skirts the western border of the marsh, while at the southern extremity an additional ditch extends northward for about one third of the length of the marsh.

It seems clear from the above that no accession of salt water can now affect the marsh in question, owing to the permanent elevation of the surface above the river whose waters are pronounced practically fresh. The retention of the salt still in the soil seems the determining factor governing the length of time that the true salt marsh plants can subsist.

Before the closing of the river the flora of the marsh was typical of that of any similar area. Reference to my journals and herbarium shows that *Juncus Gerardi* Loisel. was the principal growth in 1884. *Triglochin maritima* L., *Puccinellia maritima* (Huds.) Parl. and *Potentilla pacifica* Howell were abundant. From this locality I also find in my herbarium *Scirpus campestris* Britton, var. *paludosus* (A. Nelson) Fernald, *Atriplex patula* L., var. *hastata* (L.) Gray, *Ranunculus Cymbalaria* Pursh, *Gerardia maritima* Raf., *Solidago sempervirens* L. and others, collected between 1884 and 1895. These were taken on desultory visits and they represent only a few salt marsh plants, but as the specimens exist, they are worth recording.

My recent visits to the marsh began in 1912 and have continued to the present time, though the principal work was done in 1912 and 1913, covering the six months from May 1 to October 30. Thirty-one visits have been made, exclusive of some walks over the marsh when snow and ice covered it.

I was first struck by the immense number of plants, both native and introduced, that had invaded the area from the neighboring uplands and made a strange contrast with the plants growing there naturally. It seemed like the invasion of an army into a territory apparently little suited as a home for them, but they had evidently

come to stay, if their flourishing condition was any indication. The vigorous growth of these incoming plants was especially noticeable and will be referred to in the list. After making several visits I was more and more interested in this strange admixture. There was no special association into colonies. *Juncus Gerardi* Loisel. covered still a large part of the area, but scattered here and there amongst it were *Taraxacum officinale* Weber, *Echinochloa crusgalli* (L.) Beauv., *E. muricata* (Michx.) Fernald, *Agrostis alba* L., and varieties *vulgaris* (With.) Thurber, and *maritima* (Lam.) G. F. W. Mey. and hosts of other species, while *Linaria canadensis* (L.) Dumont had taken entire possession of considerable areas. *Erechtites hieracifolia* (L.) Raf. and *Lactuca scariola* L., var. *integrata* Gren. & Godr. are other examples of plants occupying almost exclusively a soil seemingly quite unfitted for them.

As this sketch is written with a view to making merely an annotated list of the species found, I will not add here more than a few examples by way of giving a general idea of the mixed condition. Along the creeks mingled with *Spartina glabra* Muhl., var. *alterniflora* (Loisel.) Merr. was *Ranunculus sceleratus* L., while *Cerastium vulgatum* L. showed a most vigorous growth, entirely surrounded by true salt marsh species. Salt marsh and fresh water plants grew side by side along the creeks, *Acnida cannabina* L. with *Sagittaria latifolia* Willd. and its forms, while both in the creeks and in the river itself grew *Typha latifolia* L.

With this brief account of the general conditions of the marsh, I will enumerate in order, with notes, the various plants observed and collected. I have carefully defined as the western limits the line separating the upland from the marsh itself. In some places dumps occur projecting a little into the marsh. These, as well as doubtful spots, have been rejected in considering the flora. Every plant, taken into consideration, grew on the area that was a true salt marsh before the salt water was shut off, and that is still unchanged in grade.

The reclamation of saline areas by diking or through the damming of tidal inlets has of course been of frequent occurrence in many countries, notably in Holland, yet in the botanical literature readily available it has been impossible to discover any detailed accounts of natural readjustments in the flora of such areas. This is presumably due to the fact that such tracts, which are commonly reclaimed at very considerable expense, are apt to be put to pretty prompt economic

use for agriculture, grazing, or building purposes quite subversive of the gradual biological changes here traced. However, the ecological aspects of the vegetation on considerable areas of a more or less similar nature are discussed in detail by Prof. W. F. Ganong in his highly interesting paper "The Vegetation of the Bay of Fundy Salt and Diked Marshes, an Ecological Study"[1] to which is appended a careful bibliography of the general subject.

Flora of the Marsh.

Ceratodon purpureus Brid. Abundant in open spots near the center of the marsh.

Polytrichum commune L. Abundant along the river border in muddy, wet soil, close to the water.

Pottia truncata Br. & Sch. Abundant along the river border in muddy, wet soil, close to the water.

Typha latifolia L. The Cat-tail occurs abundantly and fruits freely. It is scattered along the river border a few feet from the shore, especially at the north end, and it is common in ditches on the west side.

Potamogeton epihydrus Raf. A patch several feet across was on the river border on July 17, 1912.

Potamogeton bupleuroides Fernald. Plants with leaves only were found in the river near the shore in the cove at the south end on August 16, 1912, and September 12, 1913.

Potamogeton crispus L. Very abundant along the shore and in ditches. A resumé of my notes made from many visits during the season may be of interest. According to my observations the species behaves in the following manner. In early May *P. crispus* appears in great abundance. An examination of the plants shows that they are the old last year's stems with fresh young shoots starting from them. I wrote on May 1, 1913, "Old plants of last year very abundant, in dense masses, along the river border, sending out fresh shoots." On May 20, 1913, I made another record, "Is in full flower, the spikes projecting above the water by thousands. Masses are along the shore and in the mouths of the larger creeks, the fresh stigmas and anthers presenting a beautiful appearance under the glass. I pulled up several plants and it seems that they must be the very ones that were

[1] Bot. Gaz. xxxvi. 161–186, 280–302, 349–367, 429–455 (1903).

floating in the fall. The inflorescence is from the end of the long stems and not from the young fresh growth that I collected on May 1." On May 26, the plants were still in flower, but on May 31 the flowers had disappeared. I was unable to ascertain whether the plants fruit freely, but I have no doubt that they do, as I have perfect fruit secured near by, in a mud hole by Fresh Pond in the middle of July, as the plants were beginning to disintegrate.

On July 29, I note the gradual disappearance of the *Potamogeton*. "The Pondweed has gone below the surface for the most part, for I walked a good distance on the river bank and could see but little, and that was just beneath the surface of the water." On August 27, the following note was made, "when I first visited the marsh in the middle of July the broad band of *P. crispus*, that lined the margin of the river a few feet from the bank, was floating just below the surface and was quite visible. The plants are now disappearing and but little can be seen here and there." I think that the mass of floating plants sinks out of sight and remains through the winter at some depth, rising again in spring, the large portion of the plants disintegrating, and fresh shoots on them, that were observed in the spring of the previous year, flowering and continuing the growth.

During September and October, 1912 and 1913, broken, decaying masses of the plant were seen floating here and there along the shore and in the mouths of the ditches.

Potamogeton dimorphus Raf. Several plants in a cove at the south end.

Naias flexilis (Willd.) Rostk. & Schmidt. Very abundant in ditches and off shore.

Triglochin maritima L. Abundant over the marsh.

Sagittaria latifolia Willd. Fairly abundant in a ditch at the south end.

Sagittaria latifolia Willd., forma *obtusa* (Muhl.) Robinson. With the type, also large plants in a ditch at the west end, and mouth of ditch on the east side.

Sagittaria latifolia Willd., forma *hastata* (Pursh) Robinson. A number of plants in a ditch with the type.

Sagittaria latifolia Willd., forma *gracilis* (Pursh) Robinson. A few plants along the river margin.

Alisma Plantago-aquatica L. Finely developed plants at the mouth of a ditch close to the river. Flowering plants, August 16, early state with floating leaves September 12 and October 5.

Digitaria sanguinalis (L.) Scop. Abundant on the west border.
Panicum capillare L. Frequent on the north border.
Panicum dichotomiflorum Michx. Scattered throughout over the areas covered by *Spartina* and *Juncus Gerardi*, extremely abundant in the northern part. When growing on the grass turf the plants are small, but on clear soil they reach a great size, one plant which I measured being ten feet in diameter and rising at the ends of the culms to the height of five feet.

Echinochloa crusgalli (L.) Beauv. Occasional throughout.

Echinochloa muricata (Michx.) Fernald. (Rhodora xvii. 105–107, 1915.) A single plant on the extreme west border; probably occasional throughout.

Setaria glauca (L.) Beauv. Some on the west border.

Zizania palustris L. Several plants, eight feet tall, in a ditch at the south end.

Leersia oryzoides (L.) Sw. Large clump, north end, and abundant in ditches, south end.

Phalaris arundinacea L. Clump several feet in diameter between center and river.

Hierochloë odorata (L.) Wahlenb. A patch some fifteen feet across on the west border.

Phleum pratense L. A number of plants on the west border.

Agrostis alba L. Scattered over the area.

Agrostis alba L., var. *vulgaris* (With.) Thurb. Occasional.

Agrostis alba L., var. *maritima* (Lam.) G. F. W. Mey. Abundant over a small area at the north end.

Agrostis hyemalis (Walt.) B S P. Scattered patches.

Avena sativa L. Several plants on the west border.

Spartina Michauxiana Hitchc. Not uncommon in the northern and central portions growing on the marsh, and occasional on the borders of ditches.

Spartina glabra Muhl., var. *pilosa* Merr. By a ditch at the north end with var. *alterniflora*, scarce.

Spartina glabra Muhl., var. *alterniflora* (Loisel.) Merr. Frequent by a ditch at the north end.

Spartina patens (Ait.) Muhl. Abundant over the area especially in the northern part, covering probably a quarter of the marsh. I will cite my note of September 28, 1912, "Whereas a few stretches of marsh in the northern section, covered with *Spartina patens* and its

var. *juncea*, or *Juncus Gerardi* are practically or quite free from other vegetation, the great bulk of the areas over the marsh are covered with various species of other plants invading the areas formerly devoted to the two species above mentioned. These two species still cover most of the area, but they are quite obscured when the invading growth is in full bloom."

Spartina patens (Ait.) Muhl., var. *juncea* (Michx.) Hitchc. With the species, rather sparingly, in the northern half, but not in mats.

Distichlis spicata (L.) Greene. In considerable abundance at the north end on the marsh, and abundant on the marsh and in ditches on the west side.

Poa annua L. Several plants in soft mud in a ditch in the southern half.

Poa triflora Gilib. Frequent.

Poa pratensis L. Scattered throughout, especially abundant on the eastern border along the river.

Glyceria septentrionalis Hitchc. Abundant in ditches and wet ground throughout, especially on the west side, one plant growing on the marsh away from water.

Puccinellia maritima (Huds.) Parl. Scattered over the marsh in iso ated patches. A specimen is in my herbarium collected here on June 26, 1884. My journal records it as "abundant by the river" then.

Festuca ovina L. Occasional in dense tufts on the west border.

Festuca elatior L. One large clump, wet soil, west border.

Agropyron repens (L.) Beauv. Densely covering a considerable area in the southern portion, and scattered throughout.

Cyperus ferax Richard. Abundant at the north end and occasional at the south end. While preferring the borders of the ditches and river, it also grows on the marsh.

Scirpus americanus Pers. On west border, abundant by a ditch and scattered plants amongst *Juncus Gerardi*.

Scirpus robustus Pursh. Abundant in wet ground at the south end, where plants are 5 feet in height; occurring also by a ditch on the west border.

Scirpus campestris Britton, var. *paludosus* (A. Nelson) Fernald. Abundant by a ditch on the west side. I have a specimen in my herbarium collected here June 26, 1884.

Carex scoparia Schkuhr. Several clumps on the west border, and a few plants by the river, the latter a starved form.

Carex tribuloides Wahlenb. Borders of the river.

Carex hormathodes Fernald. Abundant at the north end by the river, and on the west border; occurring sparingly at the south end.

Carex hormathodes Fernald, var. *invisa* (W. Boott) Fernald. Margin of the river, north bank.

Carex vulpinoidea Michx. Several clumps scattered along the river and inland borders of the marsh.

Carex stipata Muhl. Several clumps along the border of a ditch on the west side.

Lemna minor L. Abundant along the river border at the north end and in ditches at the south end.

Pontederia cordata L. A single plant in the river near the shore at the north end, and another in similar situation at the south end.

Juncus Gerardi Loisel. The Black Grass still occupies a large area of the vegetation and covers, certainly, half of the marsh. It occurs in large, scattered, compact areas. See note under *Spartina patens*.

The Black Grass here grows to the height of 15 inches and then lies prostrate. I had noticed that in the latter part of July some of the areas had been mowed down, while in other areas it was lying flat. I was puzzled till one day I saw a man resting near by with scythe beside him, and from him I learned the story. The owners of Coolidge Farm very close to the marsh, cut all the *Juncus Gerardi*, and use it for packing on their celery beds in the fall to keep the stocks from freezing during the winter. The best time to cut the *Juncus* for this purpose is after the plants have dried up, when they lie prostrate. Of course, they are harder to cut at that time. This solved the mystery. The cutting is done between the middle of July and the middle of August.

Juncus tenuis Willd. On the river bank close to the water, where sometimes abundant, and in the middle of the marsh.

Juncus acuminatus Michx. Occasional in the northern portion.

Asparagus officinalis L. Two plants at the southern end.

Salix babylonica L. Three shrubs, one, sterile, by a ditch in the northern portion, and two male and female, 7 to 9 feet in height, near together by a ditch in the western portion.

Populus tremuloides Michx. Several small trees in the northern portion, the largest 2.5 inches in diameter, 2.5 feet up.

Populus grandidentata Michx. A single tree some 10 to 15 feet high on the west border.

Betula populifolia Marsh. The Gray Birch grows abundantly over

the entire marsh, especially along the borders of the ditches and the river, but it is springing up more and more on the grassy areas and I noted on September 7, 1913, that the trees had increased in size perceptibly since the year before.

Rumex crispus L. Scattered freely over the entire area.

Rumex Acetosella L. Frequent throughout, especially on the areas that have been mowed. Dense patches on the west side from 15 to 20 feet across.

Polygonum exsertum Small. Sparingly near the border of the marsh.

Polygonum prolificum (Small) Robinson. Abundant in the northern portion.

Polygonum ramosissimum Michx., forma *atlanticum* Robinson. Abundant in the southern section along one of the ditches, also in damp ground on the west side, plants reaching the height of 43 inches.

Polygonum lapathifolium L. Scattered over the extreme northern section, abundant in the northwestern corner.

Polygonum pennsylvanicum L. Very abundant over the northern third of the marsh and along the west side; scattered throughout. Plants collected with pure white flowers.

Polygonum Hydropiper L. Sparingly scattered throughout in wet places; a vigorous plant midway on the river bank.

Polygonum acre HBK., var. *leptostachyum* Meisn. Many plants at the north end, some of them in 6 inches of water in the river.

Polygonum Persicaria L. A dozen or more plants scattered over the area.

Polygonum sagittatum L. Single plant, river border, midway.

Chenopodium album L. Occasional; a flourishing plant in the middle of the marsh.

Atriplex patula L., var. *hastata* (L.) Gray. Scattered over the marsh in dense masses; frequent on the borders of ditches and in areas of *Juncus Gerardi.*

Salicornia europaea L. One patch, about a foot across, of some two dozen plants in a ditch in the middle of the marsh.

Suaeda linearis (Ell.) Moq. An area several feet across covered with this species on the river bank about midway north and south, and a similar area on the west border.

Acnida cannabina L. Abundant on the border of a ditch on the west side.

Spergularia salina J. & C. Presl. (Rhodora xii. 162, 1910.) Scattered abundantly throughout.

Cerastium vulgatum L. Occasional at the north end. On June 17, 1913, I visited several dense patches in fruit on the west border, some distance within the marsh. Each patch was about 10 × 50 feet in dimensions. I took a single plant and counted from the single root 58 stems, the outside ones 19½ inches long by measurement. This is but one instance of the vigorous growth of weeds on the marsh.

Lychnis dioica L. Several vigorous male plants in the northwest corner.

[*Ranunculus Cymbalaria* Pursh. I have not succeeded in detecting this species which formerly grew here. I have a specimen which I collected on this marsh on June 26, 1884. My journal for this date reads, "I saw only a few plants by a creek which is quite filled at high tide." This species has doubtless disappeared.]

Ranunculus sceleratus L. Several vigorous plants in a ditch, at the northern end.

Lepidium virginicum L. Very abundant throughout, especially near the river border, and forming dense patches with *Juncus Gerardi*, plants very large.

Capsella Bursa-pastoris (L.) Medic. A single plant in the middle of the marsh.

Radicula palustris (L.) Moench. Two plants only, one on the middle of the marsh, and one on the river bank, midway.

Radicula palustris (L.) Moench, var. *hispida* (Desv.) Robinson. A single plant by the river.

Barbarea vulgaris R. Br., var. *longisiliquosa* Carion. (RHODORA xi. 139. 1909.) A large clump on the west border, fruiting profusely.

Potentilla monspeliensis L. Occasional throughout, springing up especially on the mown areas.

Potentilla pacifica Howell. (RHODORA xi. 48, 1909.) Very abundant along the river and ditches and also springing up freely on the marsh away from these borders. I have a specimen collected by me on this marsh on June 26, 1884, with the note from my journal of the same date, "Abundant in the salt-marsh."

Rosa rugosa Thunb. Native of northern China, Corea and Japan. A thrifty shrub 3 feet high near the north end.

Trifolium pratense L. Rather abundant on the west side, and occasional on the mown areas.

Trifolium hybridum L. Occasional, especially on the west border.

Melilotus alba Desr. A single plant on the west side.

Ailanthus glandulosa Desf. A young tree, 5 or 6 feet high, near the center of the marsh in the southern half.

Rhus typhina L. A single small plant directly on the marsh in the northern part.

Impatiens biflora Walt. Abundant on the west side on the borders of a ditch. A single vigorous plant was growing out on the marsh at the south end.

Viola lanceolata L. A few plants on the borders of a ditch at the south end, and a clump about 18 inches across by a ditch on the west side.

Epilobium angustifolium L. A few low plants in the center of the marsh, and scattered throughout.

Epilobium coloratum Muhl. Frequent over the marsh, abundant at the south end.

Epilobium adenocaulon Haussk. Very abundant in the south end.

Oenothera muricata L. Occasional on the river border, and frequent elsewhere.

Oenothera biennis L. Scattered along the east side near the river bank.

Cicuta bulbifera L. Frequent along the river bank and ditches.

Sium cicutaefolium Schrank. A single plant in a ditch at the south end.

Limonium carolinianum (Walt.) Britton. A few scattered plants along the river bank, and by ditches throughout.

Asclepias incarnata L., var. *pulchra* (Ehrh.) Pers. Several plants on the border of the river in the water, and by a ditch on the west side.

Cuscuta Gronovii Willd. Abundant at scattered stations along the river bank and elsewhere, twining over *Aster novae-belgii* and other plants.

Verbena hastata L. A number of plants at the south end in wet ground.

Lycopus americanus Muhl. Abundant throughout, especially along the river bank.

Mentha arvensis L. Three or four plants together near the river bank midway.

Solanum Dulcamara L. Abundant in one spot on the west side.

Linaria vulgaris Hill. Frequent throughout in dense patches.

Linaria canadensis (L.) Dumont. Abundant throughout, the plants remarkably vigorous and large. I will quote from my journal of August 27, 1912, "It is interesting to see the conduct of some of the invading plants. They behave as many species have done and are still doing, when introduced into a new region, taking possession without resistance and densely covering large tracts in profuse abundance. *Lactuca scariola*, var. *integrata*, *Erechtites hieracifolia*, *Linaria canadensis* are illustrative. These plants grow over the marshes, that were once covered by high tides, in the greatest profusion. It is strange to see *Linaria canadensis* so thickly growing. I saw in one place, to-day, a large patch, a few rods across, that had been cut down, and that would make, if stacked, a good-sized cock."

Veronica peregrina L. A single plant on the west side.

Plantago major L. Occasional in scattered localities.

Plantago decipiens Barneoud. Scattered over the marsh, forming colonies.

Sambucus canadensis L. Several vigorous plants on the west side, 5 to 6 feet high.

Eupatorium purpureum L., var. *maculatum* (L.) Darl. A single large plant not far from the center of the marsh.

Solidago sempervirens L. Abundant at the north end, and scattered throughout.

Solidago rugosa Mill., var. *aspera* (Ait.) Fernald. (Rhodora xvii. 7, 1915). Several plants at the north end.

Solidago canadensis L. Sparingly near the center and at the north end.

Solidago altissima L. Several plants in the north section.

Solidago graminifolia (L.) Salisb. Several plants in two localities in the northern half.

Aster vimineus Lam. A number of plants scattered over the marsh.

Aster lateriflorus (L.) Britton. A single large plant in the middle of the marsh.

Aster novi-belgii L. Scattered plants throughout.

Aster subulatus Michx. Abundant throughout, especially on the borders of the ditches. It reaches the height of 4 feet.

Erigeron canadensis L. Scattered over the densely compact grassy areas, including Black Grass, *Juncus Gerardi*.

Baccharis halimifolia L. Well developed staminate and pistillate shrubs, some $4\frac{1}{2}$ feet high, are growing at the north and south ends

and along the river border. The plants are vigorous and form fruit freely. These shrubs, undoubtedly, came from seed from the cultivated plants growing along the border of Mt. Auburn Street, one third of a mile and more away. The akenes, furnished with long and copious pappus, are readily borne by the wind.

Pluchea camphorata (L.) DC. A good many plants in the southern half, in the middle of the marsh and along ditches. Well developed fruit was formed.

Anaphalis margaritacea (L.) B. & H. A few plants on the western portion.

Gnaphalium polycephalum Michx. Very abundant and vigorous over the densely compact grassy areas, including Black Grass, as well as in more open soil.

Ambrosia artemisiifolia L. Frequent on the west border.

Xanthium echinatum Murr. Several fruiting plants at the north end.

Helianthus laetiflorus Pers. Several flowering plants and about two dozen young plants at the south end.

Bidens discoidea (T. & G.) Britton. One or two plants, border of ditch, near the river about midway on the marsh.

Bidens frondosa L. Abundant at mouths of ditches and along the river bank; extremely abundant on the west side; plants vigorous.

Bidens connata Muhl. (Rhodora x. 197–200, 1908.) Scattered here and there over the marsh, a few very large plants about midway on the border of a ditch near the river.

Bidens cernua L. Scattered throughout along the river bank and elsewhere.

Achillea Millefolium L. Occasional.

Tanacetum vulgare L. Several plants at the south end and a few scattered throughout.

Artemisia vulgaris L. Abundant along the marsh border.

Erechtites hieracifolia (L.) Raf. "I noted this from the side of the cemetery and I should say that it covered half of the southern half of the area, besides being extremely abundant in close patches, in the northern half. Also scattered here and there." Journal, Aug. 31, 1912. "Is rapidly discharging its fruit, and, as I walked through the dense areas occupied by this plant, the surface of the marsh was snow-white with the fallen pappus." Journal, Sept. 25, 1912. The dense growth of this plant has nearly killed out the Black Grass,

grasses and low plants in the areas that it covers. See note under *Linaria canadensis*.

Cirsium lanceolatum (L.) Hill. A few vigorous plants scattered over the area.

Cirsium arvense (L.) Scop. Several plants in the center of the marsh on the border of a ditch.

Cichorium Intybus L. Occasional throughout.

Leontodon autumnalis L. Occasional throughout, especially where the *Juncus Gerardi* has been cut. "A very vigorous plant, or two or three plants matted together, on the marsh at the south end. The scapes, which spread out along the ground in a circle and rose erect in the center, were 2 feet, 9½ inches long. The plant was in full flower." Journal, Sept. 7, 1913.

Taraxacum officinale Weber. Extremely abundant over the entire area, growing freely over the beds of *Juncus Gerardi* and elsewhere. "I observed two plants on the marsh at the south end. They were enormous. The one from which I took leaves and stems was 30 inches in diameter, the scapes were 2 feet high, and the plant was a solid mass of leaves." Journal, Aug. 31, 1912.

Sonchus arvensis L. Several stations over the marsh, one large area at the south end, and a vigorous flowering patch by the river about midway north and south.

Sonchus oleraceus L. Abundant throughout, over the densely compact grassy areas as well as in more open soil. In many cases the auricles of the clasping base of the leaves were *rounded* but the akenes were invariably *wrinkled transversely*.

Lactuca scariola L., var. *integrata* Gren. & Godr. Especially abundant in the southern portion, growing densely and very tall and vigorous. I measured one plant, 6 feet, 10 inches high, and it stood up but little above the rest. The dense growth of this species has pretty well killed out the grasses and low growth in the areas occupied by it. See note under *Linaria canadensis*.

Lactuca canadensis L. Occasional throughout.

The plants enumerated above are in my herbarium. In the verification of a number of forms I have been assisted at the Gray Herbarium. The following short list includes species that I collected and verified but did not preserve, as at the time I was not intending to carry out this work.

Anthoxanthum odoratum L. 1912, July 19. A single plant in the middle of the marsh.

Poa compressa L. 1912, July 17. A single plant.

Secale cereale L. 1912, July 17. A single plant in the middle of the marsh; July 19, a few plants.

Hordeum jubatum L. 1912, July 19. A plant in the middle of the marsh.

Rosa virginiana Mill. 1912, July 17. One small plant on the shore.

Hypericum boreale (Britton) Bicknell. 1912, July 19. A number of plants together by the river.

Cicuta maculata L. 1912, July 19. A single vigorous plant by a ditch.

Gerardia maritima Raf. 1912, Aug. 16. A single plant on the marsh. I have in my herbarium specimens of this species which I collected on this salt marsh, Oct. 5, 1890.

Bidens connata Muhl., var. *petiolata* (Nutt.) Farwell. (Rhodora x. 197–200, 1908.) 1912, July 17. One plant on the river bank.

The plants in the above list that occur on salt marshes either habitually or at least very frequently are as follows:

Potamogeton crispus
Triglochin maritima
Hierochloë odorata
Agrostis alba, var. *maritima*
Spartina glabra, var. *pilosa*
" " " *alterniflora*
" *patens*
" " var. *juncea*
Distichlis spicata
Puccinellia maritima
Hordeum jubatum
Scirpus americanus
" *robustus*
" *campestris*, *var. paludosus*
Carex hormathodes
" " var. *invisa*
Juncus Gerardi
Polygonum exsertum
" *prolificum*
" *ramosissimum*, forma *atlanticum*
Atriplex patula, var. *hastata*
Salicornia europaea
Suaeda linearis
Acnida cannabina
Spergularia salina
Potentilla pacifica
Limonium carolinianum
Gerardia maritima
Plantago decipiens
Solidago sempervirens
Aster novi-belgii
" *subulatus*
Baccharis halimifolia

Summary.

Total number of species, varieties and forms observed on the marsh 164
Plants generally affecting saline habitats . . 34
Plants which have appeared since the reclamation began 130

From these figures it will be seen that the plants of saline habit constitute a little over 20 per cent and the invaders something above 79 per cent of the vegetation as reconstituted. It may be of interest to note that more than half of the present vegetation of the marsh belongs to four families, while the remainder belongs to many scattered families, the figures being as follows:

Gramineae . . . . . 20+ per cent
Cyperaceae . . . . . 6+ " "
Polygonaceae . . . . . 6+ " "
Compositae . . . . . 21+ " "
All the other families . . . . . 45 " "

Cambridge, Massachusetts.

THE IDENTITY OF CIRCAEA LATIFOLIA AND THE ASIATIC C. QUADRISULCATA.

M. L. Fernald.

The common Enchanter's Nightshade of dryish woods in the eastern United States and southeastern Canada is generally treated as identical with *Circaea lutetiana* L. of Europe. Yet a comparison of the two plants as well as of accurate descriptions and plates shows that they differ in many important characters.

Typical *Circaea lutetiana* of Europe has the stems closely pubescent throughout; the stolons thick and almost tuber-like; the leaves broadly ovate; the petals broadly obovate, longer than broad and obtuse to rounded at base; and the mature fruit without corruga-

tions The American plant which passes as *C. lutetiana* has, on the other hand, the stems glabrous below the inflorescence or at most remotely pubescent; the stolons filiform; the leaves oblong-ovate; the petals broadly obovate, as long as or longer than broad and wedge-shaped at base; and the mature fruit with 3–5 corrugations on each face and larger than in the European plant. Differing in all these characters and geographically quite isolated, it is apparent that the American plant should not be confused with *C. lutetiana*.

That the two were not identical was apparently recognized by the older botanists, for as early as 1700 Tournefort had a "*Circaea Canadensis, latifolia, flore albo*," [1] which formed the basis of the Linnean *C. lutetiana, β. canadensis*.[2] This plant referred by Linnaeus, as a variety, to *C. lutetiana* was not further defined by him and, in view of the comparatively narrow leaf of the American plant, the Tournefortian description, "latifolia," copied by Linnaeus, forms an unfortunate basis for separation. Yet our American plant was long known as var. *canadensis*,— by Michaux, Pursh, Nuttall, Torrey and others. Even as early as 1756, however, John Hill had taken up the Tournefortian *Circaea canadensis, latifolia, flore albo* of North America as *C. latifolia* [3] which he described at length, with the leaves "broad and oblong," as opposed to "oval" in his description of *C. lutetiana* and "broad and short" in his *C. minima* (*C. alpina*), and the "seed-vessel. . . .large" as contrasted with "seed-vessels. . . .small" in *C. lutetiana*. By these two essential characters, oblong leaves and larger fruits, Hill was clearly describing the American representative of *C. lutetiana*, as he was when he emphasized the tall plant by stating that "The stalk is round, upright, firm, hairy, and two feet high," although the character "hairy" appears only at the summit of the stem, along the axis of the inflorescence. To be sure, the name *C. latifolia* found no recognition in *Index Kewensis*; but there is hardly a question that our American representative of *C. lutetiana* should be called *C. latifolia* Hill.

In studying the Old World species of *Circaea* a characteristic plant of eastern Asia,—Manchuria, Amur, and Japan — has been found which, in aspect as well as in all the technical characters of glabrous stem, outline of leaf, shape of petal and corrugation of fruit, exactly

[1] Tourn. Inst. i. 301 (1700).
[2] L. Sp. Pl. i. 9 (1753).
[3] Hill, Brit. Herb. 138 (1756).

coincides with the common Alleghanian plant. No stolons of the Asiatic plant have been examined but so accurately does it coincide with our plant in all the other crucial points that there can be hardly a question of their identity. The Asiatic species which seems clearly to agree with ours is *C. quadrisulcata* (Maxim.) Franchet & Savatier,[1] based upon *C. lutetiana*, var. *quadrisulcata* Maximowicz,[2] a plant originally described from Amur and distinguished by its 4-sulcate fruit, its glabrous stem, and its lance-ovate leaves. The identification of this plant of eastern Asia with our Alleghanian woodland species is interesting as adding still another to the large group of genera and species — *Caulophyllum*, *Podophyllum*, *Liriodendron*, *Polygonum virginianum*, etc.— which are common to these two isolated areas.

Gray Herbarium.

WEED GROWTH AND UNUSUAL RAINFALL.

J. Y. Bergen.

The unusual rainfall throughout the central and northeastern states during the summer just past has greatly influenced most kinds of vegetation. In the course of a long-continued, hand to hand contest with weeds in a garden of moderate size the writer was led to note some differences between the relative abundance and luxuriance of growth of certain weeds this year and in ordinary summers. The rainfall in and near Boston during July of this summer (1915), 8.85 inches, has been equaled only twice in 98 years, the July average for that whole period being about 3.57 inches.[3] The August rainfall this summer is 5.63 inches, while the 98-year average for the month is about 4.01 inches, making the rainfall for the two months almost double the usual amount. Farther away from the coast the precipitation has in many localities been much in excess of the values for Boston just cited.

[1] Franch. & Sav. Enum. Pl. Jap. i. 169 (1875).
[2] Maxim. Prim. Fl. Amur. 106 (1859).
[3] 1818–1870 observations at Roxbury; 1871–1915 observations of U. S. Weather Bureau in Boston.

Herbaceous vegetation in general has grown more vigorously than usual in consequence of the abundant water supply. A few examples from a grassy vacant lot in Cambridge, with very poor sandy soil, may suffice to illustrate this. *Ambrosia artemisiifolia* showed plenty of specimens growing to a height of 1.5 metres; *Oenothera biennis* reached a height of 1.72 metres; *Erechtites hieracifolia* (a moisture-loving plant which does not usually grow at all in this bit of ground) was 2.0 metres high *Helianthus grosseserratus*, growing in tough sod near by, reached a height of 3.3 metres. The annual weeds of the field and garden are perhaps rather more sensitive in their responses to variations in their environment than most seed plants. Competition is especially sharp among these species and they have no such monopoly of their seed beds as do many plants which grow in uncultivated soil. Most of the species which the agriculturist reckons as weeds are mesophytes, but the range in water requirement between such a plant as the ox eye daisy, *Chrysanthemum Leucanthemum*, var. *pinnatifidum* and such a one as the great ragweed, *Ambrosia trifida*, is rather wide.

For convenience some of the common weeds of New England in regard to which the writer has been able to obtain notes this summer may be arranged in three groups:

1. Those which are decidedly more vigorous than usual.
2. Those which show little difference in growth from that of ordinary seasons.
3. Those which are relatively less important than in ordinary seasons.

Prominent among the first group are the coarse annual grasses, finger grass, *Digitaria humifusa*, crab grass, *Digitaria sanguinalis*, barn yard grass, *Echinochloa crusgalli*, and old witch grass, *Panicum capillare*. These are all shallow-rooted species, with large and probably actively transpiring leaf surfaces. The only common representative of *Cyperaceae* is the rather abundant, very variable, tuber-bearing *Cyperus strigosus*. Other weeds much in evidence this season are lady's thumb, *Polygonum Persicaria*, horseweed, *Erigeron canadensis*, ragweed, *Ambrosia artemisiifolia*, and beggar ticks, *Bidens frondosa*. All these weeds, though they are troublesome in ordinary soils and every year, flourish best when they can get an abundant supply of moisture.

The weeds which the writer has found to be not much more conspicuous and annoying this year than usual are many of them among the

most pestilent to be found in New England fields and gardens. Prominent among these are couch grass, *Agropyron repens*, green foxtail, *Setaria viridis*, common sorrel, *Rumex Acetosella*, pigweed, *Chenopodium album*, rough pigweed, *Amaranthus retroflexus*, and lady's sorrel, *Oxalis corniculata*. The *Agropyron* roots deeply and can always secure water, even from rather dry soils, through its wide-ranging, many-rooted rhizomes. The *Rumex* has an exceedingly extensive and intricate root system. It is not so easy to explain why the other four species named in this group seem to be so little affected by the presence, or absence of an abundant water supply.

The only weeds which have seemed to me relatively less important this season than usual are carpet weed, *Mollugo verticillata* and purslane, *Portulaca oleracea*. Both are xerophytes, as is evident from the way in which they tolerate extreme drought conditions, the former growing on very dry sand dunes, the latter a common weed in some of the driest parts of eastern Kansas and capable in ordinary climates of growing long after it has been uprooted and left lying on the surface of the soil. The seeds of purslane, according to Professor G. E. Stone of the Massachusetts Agricultural college, are exceptional in their power to grow in very dry soil, germinating in earth containing only 0.5 per cent of moisture. It would not be easy to show marked xerophytic features in the form or the structure of *Mollugo*, but *P. oleracea* is decidedly succulent and is the most familiar plant of this type throughout a large portion of the central and the northeastern states.

Doubtless other observers may in many cases have found different weed species predominant this year from those that have come under my own notice. Professor M. A. Chrysler of the University of Maine, at Orono, Maine, reports the July rainfall this year as 6.67 inches, while the average rainfall for the month is 3.22 inches. He does not report any weeds as having been unusually common. Mr. H. E. Downer reports from the botanic garden of Smith College, at Northampton Mass., that almost all weeds are more troublesome than usual this season and names *Digitaria sanguinalis*, *Mollugo verticillata*, *Portulaca oleracea*, *Oxalis corniculata*, *Acalypha virginica*, *Convolvulus arvensis*, and *Ambrosia artemisiifolia* as particularly abundant.

Weeds of lawns and grass lands, as a rule, have shown less response to the stimulus of an unusual rainfall than have many of the denizens of tilled ground. This may be partly because the grasses among

which they grow have taken up much of the water. But other reasons, in the cases of such deep-rooted composites as *Taraxacum, Cichorium,* and *Leontodon* may be found in the facts that their roots reach well down into the soil after water and that their latex supply appears to hinder excessive transpiration, so that they are more independent of an abundant water supply than are most leafy, non-succulent plants.

Along the borders of sidewalks and in the stone-paved gutters of Cambridge streets there is found a limited flora, consisting largely of small and somewhat xerophytic plants, among which are a few grasses, such as *Eragrostis capillaris, Eragrostis Frankii, Poa annua,* and a few other species, which do not usually either flower or fruit. Other plants of frequent occurrence are, *Polygonum aviculare, Mollugo verticillata, Spergularia rubra, Euphorbia maculata, Euphorbia humistrata,* and *Gnaphalium uliginosum,* all small-leaved plants of little capacity for transpiration. Depauperate specimens of *Plantago Rugelii* are also abundant. The members of this sidewalk flora are for the most part no more conspicuous than usual this summer, though perhaps the grasses have fruited more successfully than they generally do.

Summing up my own observations in the briefest terms, it may be said that many of our annual weeds and ruderal plants have profited greatly by the unusual water supply which they have received this summer and that in general, but not always, more than ordinary luxuriance has characterized those species which would *a priori* have been classed as large consumers of soil water.

CAMBRIDGE, MASSACHUSETTS.

EXTENSIONS OF RANGE.— During a visit to Monhegan Island on the coast of Maine in the summer of 1911 the writer noticed, while hurrying from "Cathedral Woods" to the wharf to catch the boat to Boothbay, a few specimens of *Carex crinita* which had an unusual appearance. These were hastily gathered and upon later study proved to be *C. crinita,* var. *Porteri* (Olney) Fernald. It was not possible to return for further collections, so no information is at hand as to the distribution or abundance of this rare variety on Monhegan. Its mere occurrence on this oceanic island, lying isolated, twenty miles from the mainland, is sufficiently remarkable and interesting. The variety is based upon specimens collected by Dr. Thomas C. Porter,

near the base of Mt. Kineo, Moosehead Lake, Maine, August 28, 1871, and so far as the writer knows has never been collected since until these Monhegan specimens were found. Some of the latter material has been deposited in the Gray Herbarium, where its identification has been confirmed by Prof. M. L. Fernald.

Digitalis purpurea L. is described in Gray's Manual 7th edition, p. 726, as having in America a very restricted distribution in "Meadows and pastures, Cape Breton I.; also N. Y.; rather rare and local a casual escape from gardens." The writer was accordingly greatly surprised during the summer of 1914 to find it growing in considerable abundance along a sandy roadside south of Glen Orchards near the west shore of Muskoka Lake, Ontario. Inquiry elicited the fact that it had been introduced from England by a settler twenty years ago. It has gradually spread from his farm along roadsides for several miles, and also back into open places in the woods. It seems thoroughly established and naturalized, seeds freely, and is spreading widely. It occurs as separate, scattered individuals rather than in colonies.—Frederick O. Grover, Oberlin College, Oberlin, Ohio.

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RANGE EXTENSION OF CEANOTHUS SANGUINEUS.

Oliver A. Farwell.

In the Synoptical Flora and in Piper's Flora of the State of Washington the distribution of *Ceanothus sanguineus*, Pursh is given as from Brit. Columbia to N. California and Idaho. Howell gives the same range but extends it eastward to Montana. Rydberg, in the Flora of Montana, says it occurs only on the western slope of the main range of the Rocky Mountains. Coulter's Manual, 1st. Ed., credits it to the region of the Missouri and its tributaries but it is not given a place in the 2nd. edition. Pursh, who first described it from material collected by Lewis, gives it as "Near the Rocky Mountains, on the banks of the Missouri"; in so far as this statement by itself is concerned, it might mean either the eastern or western slope of the Rockies or both; I have not access to any records that might determine the point in question. The plant, however, has been considered to belong exclusively to the northwestern region west of the main range of the Rocky Mountains. Its discovery, therefore, in the Keweenaw Peninsula, in Michigan, is of more than local interest. I first collected it in fruit in August, 1886, near Copper Harbor. At that time, being young in years and botanical experience, my main object was to make each species I found agree with some one of those enumerated in Gray's Manual; so it naturally found a resting place in the species cover of *C. Americanus* where it remained forgotten until 1914. Having in that year had occasion to examine critically my material of the eastern species I at once observed that the Keweenaw plant was not *C. Americanus*. An investigation convinced me that it was either *C. sanguineus* or a new species. On a trip to the Lake Superior region

early in July of this year (1915) I found the shrub in full bloom. It proved to be *C. sanguineus*. I examined a section of territory about half a mile long by as much wide and found the plant to be quite plentiful; the probabilities are that it may be found over a much larger area. It is found in rocky woods, the rock being of trap rock formation; the woods are mostly of evergreen trees but have a good sprinkling of oak, birches, willows, poplars, maples and other deciduous trees and shrubs. It is, of course, indigenous to this region. The possibilities of its having been an introduction from west of the Rockies are so remote as to be negligible. Plants from the eastern slope of the Rockies might be introduced to the Lake Superior region by way of the rivers and streams which find an outlet through Lake Winnipeg, Winnipeg River, the Lake of the Woods, Rainy Lake River, and Pigeon River to Lake Superior but this line of travel would not transport the seed of a plant from the western slope, nor would the Missouri carry the seed from that region to Lake Superior. The same remarks apply to another plant, the *Mimulus moschatus*, Dougl., which is native to the same regions; it may have been introduced further east as an escape from cultivation but the argument will not apply here, since, so far as I have been able to learn, it was never cultivated in the Copper district of Michigan unless gathered for the purpose from the local native plant. The only probable explanation of such widely separated stations is that the species in preglacial times were more generally distributed but that the ice of the glacial period destroyed intermediate stations.

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THE CHARACTERS AND RANGE OF CAREX LAEVIVAGINATA.

M. L. Fernald.

In 1909, in his treatment of *Carex* in Engler's *Pflanzenreich*, Kükenthal described from Biltmore, North Carolina, *Carex stipata*, var. *laevivaginata*.[1] In typical *C. stipata* the broadish flaccid leaves have the scarious cross-puckered sheath slightly prolonged at the orifice into a very thin membrane; but in var. *laevivaginata*, as described by Kükenthal, the leaves are firmer and narrower (3 mm. broad), with the sheath plane (not cross puckered) and thickened at the orifice; and the inflorescence is shorter than in typical *C. stipata*. Subsequently, but without amplification of the characters, Mackenzie has elevated the plant to specific rank as *C. laevivaginata* (Kükenth.) Mackenzie [2] and has extended the range to Maryland.

That *Carex laevivaginata* is a distinct species of definite range now seems fairly clear, for a considerable mass of specimens in the Gray Herbarium and the Herbarium of the New England Botanical Club shows it to have not only the characters already emphasized but some others to which attention is here directed, and to occur somewhat generally in damp rich woods and swamps of the Alleghanian region. The most striking character of the plant, besides its firmer and narrower leaves and smooth sheaths with firm often cartilaginous orifice, is its much greener and simpler inflorescences. In *C. stipata* the crowded often somewhat paniculate inflorescence has a yellowish color and in age becomes quite brown; and the perigynia are about 4 mm. long. In *C. laevivaginata*, on the other hand, the inflorescence is simpler and looser, at first pale-green, but in maturity with a very slight brownish tinge; and the perigynia are 5–6.5 mm. long, thus giving the cylindric head an even more muricate appearance than in *C. stipata*.

Carex stipata is a plant of the Canadian and Transition Zones, occurring in wet habitats from Newfoundland to British Columbia, southward to the District of Columbia, Virginia, the Great Lake states, Iowa Kansas, New Mexico and California; with an extremely large

[1] Kükenth. in Engler, Pflanzenr. iv. Fam. 20, 172 (1909).
[2] Mackenzie in Britton & Brown, Ill. Fl. ed. 2, i. 371 (1913).

variety, var. *uberior* C. Mohr, in the Louisianian area from South Carolina to Florida and Texas. *C. laevivaginata*, on the other hand, is essentially Alleghanian, occurring from Massachusetts to North Carolina, Tennessee, and Illinois. Judged by its representation in herbaria it is much less common in New England than *C. stipata*. The herbarium material immediately accessible shows 88 sheets of *C. stipata* from New England, but only 11 sheets of *C. laevivaginata* representing the following 6 stations. Massachusetts: Purgatory Swamp, Norwood, June 16, 1878, *Faxon*, June 21, 1896, *E. F. Williams*, June 27, 1897, *Sidney Harris;* Williamstown, May 30, 1898, *J. R. Churchill*, June 17, 1901, *E. F. Williams;* swamp, Stockbridge, June 28, 1900, *Ralph Hoffmann*. Rhode Island: without definite locality, *Olney;* Cat Swamp, Providence, July 2, 1893, *J. F. Collins*. Connecticut: North Cromwell or Farmington, 1878, *Chas. Wright* (both *C. stipata* and *C. laevivaginata* with one label). Judge Churchill has recently informed the writer that *C. laevivaginata* is also found in rich soil near the Merrimac at Bradford, Massachusetts. The species is, however, so little known as yet that further information as to its local distribution and its habitat is needed.

Gray Herbarium.

Arenaria stricta in the White Mountains.— In the seventh edition of Gray's Manual *Arenaria stricta* Michx. is reported as found on Mt. Washington, N. H., the citation being based upon a specimen collected by Mr. W. H. Manning. That this reference, however, is due to a transposition of labels and that the specimen upon which it is founded really came from Glens Falls, N. Y., has been convincingly shown (Rhodora, xi, 184–5) by Professor Fernald, who adds that the 'summit of a hill, Holderness, N. H.,' where the plant was collected in July, 1891, by Dr. R. C. Manning, is, so far as he knows, the only New Hampshire station for this species. It was of interest to me, therefore, on 19 July, 1915, while I was collecting on Hart's Ledge, at the southern extremity of the Montalban Range in the lower part of Crawford Notch in Coös and Carroll counties, thirteen miles south of Mt. Washington and about twenty-five miles northeast of Holderness, to find an abundance of this plant growing in woods, on damp rocks, along a steep and somewhat intermittent watercourse. This station is on the southeast side of the ledge in the township of

Bartlett, Carroll County. A more extended visit on 9 September of the same year disclosed the plant on similar damp rocks on the west slope and also in the coarse gravels of the summit (2009 feet), both places being a little west of the county line in Hadley's Grant, Coös County. At the present, then, we may probably regard this ledge as the northeastern limit of the species. Near *A. stricta* in the Carroll County station was its congener, *A. groenlandica* (Retz.) Spreng., which is not uncommon on the mountains of the Montalban Range, but which is perhaps seldom found in so incongruous a situation as here, growing under the shade of red oak trees! Other species of interest noted upon the ledge were *Panicum latifolium* L., *Oryzopsis racemosa* (Sm.) Ricker, *Polygonum scandens* L., *P. Douglasii* Greene (in great abundance on both dry and damp ground, in the sun and in the shade), a slender native Chenopodium matching the description of *C. leptophyllum* Nutt., var. *oblongifolium* Wats., *Cardamine parviflora* L., *Geranium Robertianum* L., *G. Bicknellii* Britton, *Arctostaphylos Uva-ursi* (L.) Spreng., and *Specularia perfoliata* (L.) A. DC. Of these the two Polygonums, the Chenopodium, and the Arctostaphylos are new to Coös County, while the Panicum, the Cardamine, and the Specularia are unreported from that county but on Hart's Ledge miss inclusion within its limits by only a few hundred feet. Specimens of all the plants mentioned are to be deposited in the herbarium of the New England Botanical Club. It may be remarked that the vicinity of Bartlett, where plants of the warmer district of east central New Hampshire mingle with those of the colder areas of Crawford Notch and the Montalban and Rocky Branch Ranges, and where the numerous lower mountains are diversified by frequent cliffs and extensive open ledges, offers many attractions to the collector.—Arthur Stanley Pease, Urbana, Illinois.

The Occurrence of Botrychium virginianum, var. europaeum in America.—About the Gulf of St. Lawrence, especially on the west coast of Newfoundland, the south coast of the Labrador Peninsula, and on the Gaspé Peninsula of Quebec, there occurs a grape-fern clearly related to *Botrychium virginianum* (L.) Sw., but differing in the much less dissected segments of the sterile frond and, in its most characteristic development, in its heavy or firm texture. The plant proves to be a very close match for the European material passing

as *B. virginianum*, a plant which, as represented in the Gray Herbarium and as shown by the plates illustrating the Scandinavian and Russian specimens, departs from the common Alleghanian and eastern Asiatic material in exactly the points indicated above. This European plant was set off by Presl as *B. anthemoides*,[1] but has subsequently been treated as *B. virginianum*, var. *europaeum* Ångström.[2]

Besides the material from the region of the Gulf of St. Lawrence, characteristic specimens have been seen from the Thunder Bay District, Ontario, and from northern New England. In New England some of the plants seem to be exactly intermediate, as judged by the cutting of the frond, between *B. virginianum* and var. *europaeum*, but south of this area all the plants seem to be typical *B. virginianum*. The plant with the less dissected frond, being the only representative of the species in Europe and occurring in North America chiefly north of the range of typical *B. virginianum*, seems to the writers to be well separated as a variety which should be called *B. virginianum* (L.) Sw., var. *europaeum* Ångström.— M. L. Fernald and Harold St. John.

Bidens connata petiolata.— At Franklin, Connecticut, in low meadows, *B. connata petiolata* occurs with noticeably large heads and with achenes considerably exceeding the length of 4–6 mm. given for the species in the last edition of the Manual. In the Franklin plants the mature central achenes are 8–9 mm. long. Very few central achenes shorter than 8 mm. were found in the many heads examined by the writer. The measurements refer to large, well developed heads. The awns, too, are longer than in the species, as well as stouter, and the two pairs are often of equal length. Short golden-yellow rays are usually developed early but soon fall away. The plants are abundant in Franklin Meadows, and very uniform in habit. They show well a difference between variety and species, which seems, so far as the writer's observation extends, to be constant, but is, however, more readily recognized in the field than in the herbarium. In the typical form of the species the head is low and hemispherical, while in the variety it is taller and cylindrical, or at full maturity slightly broadened upward. In fresh plants the contrast is striking. Specimens have been deposited in the Gray Herbarium.— R. W. Woodward, New Haven, Connecticut.

[1] Presl. Abh. böhm. Ges. ser. 5, v. 323 (1848).

[2] Ångström, Botaniska Notiser (1854) 68.

THE MUTATION FACTOR IN EVOLUTION: WITH PARTICULAR REFERENCE TO OENOTHERA. By R. RUGGLES GATES.[1] Since DeVries discovered the two aberrant forms of *Oenothera Lamarckiana* that he called *brevistylis* and *laevifolia* at Hilversum in 1887, the genus *Oenothera* probably has been studied more intensively than any other similar group of plants. As evidence of this analytic activity a literature of some five hundred titles has been produced. Every botanist appreciates the numerous facts that have been brought to light regarding the classification, distribution, gross morphology, cytology and genetics of the genus, and owing to the volume of the publications everyone is thankful when compilations are made. DeVries has brought together the greater part of these facts in Die Mutationstheorie and Gruppenweise Artbildung. The volume under consideration supplements these two works by a fairly complete consideration of the taxonomy, cultural history and cytology of the group. In addition the author brings together the data from his own extensive pedigree culture, and urges, rather didactically at times, the conclusions he has drawn from them.

The book purports to be a reconnaisance of the theory of Evolution by Mutation, it really is wholly a consideration of the biology of the Oenotheras. The author rests his case on the one group of facts. DeVries did not make this mistake; for, as Cervantes says, "It is the part of a wise man to keep himself today for tomorrow, and not to venture all his eggs in one basket." DeVries did indeed lay great stress upon his work with the evening primroses, but he did not overlook numerous other props for his hypothesis,— props so sturdy that in the opinion of some, the Oenothera investigations might be disregarded without weakening the edifice. Perhaps few biologists adhere strictly to DeVries' views of Evolution. In particular it might be mentioned that he did not go far enough in distinguishing between germinal and somatic variations, and that he has not kept pace with the facts regarding inheritance. At the same time, it must be admitted that in addition to the great stimulus to experimental biology that his work effected, DeVries made two great general contributions. He showed the frequency with which germinal changes of comparatively great size occur, and why they are not swamped by intercrossing. But these generalizations make no new Evolution theory. They merely extend and modify Darwin's ideas insofar as these new facts tend to change the emphasis the latter placed upon particular types of variation.

These changes in viewpoint may be made with total disregard for the Oenothera work. In fact, perhaps few angiosperm genera could have been selected which are so fundamentally unsuited for genetic work from which broad conclusions are to be drawn as Oenothera. As Gates shows, numerous aberrant types of chromosome distribution occur at gametogenesis. Presumably many of the daughter cells

[1] London. Macmillan, 1915. pp. I–XIV + 353. Figs. 114.

formed by such irregular division are aborted. Thus there is a selective elimination of potential gametes. Further, many of the pollen grains, and possibly the egg cells, are not functional. Again, an extremely large percentage — often the majority — of the zygotes formed are not viable. This will be apparent to anyone who takes the trouble to make germination tests of Oenothera seeds. Even after discarding the many seeds that casual examination shows to be worthless, it is seldom that over sixty percent of the remainder produce mature plants, and the germination may drop as low as five percent. Now, it is quite likely that the only useful laws of heredity will be those which like the laws of physics and chemistry are mathematical descriptions of cycles of events from which predictions of what must occur under like circumstances may be made. Is it strange then, that many biologists are cautious when asked to accept as a basis for such descriptions, breeding results from plants like the Oenotheras where only a small portion of the facts can be known owing to the immense number of potential plants lost through the abortion of both zygotes and gametes? It is like asking a chemist to accept theories as to the structural formulae of organic compounds upon which only determinations of nitrogen and oxygen have been made.

These facts are boldly disregarded by the author in his chapters on "Hybridisation and Hereditary Behavior" and "The Relation between Hybridisation and Mutation." The Oenotheras, he says, have four main types of hereditary behavior: "(1) mutation crosses, (2) Mendelian splitting, (3) blending and modification of characters, and (4) twin hybrids." Much of the discussion under these heads is a severe arraignment of Mendelism, but the author's contempt for the Mendelian theory of heredity is not that bred of familiarity. If the reviewer has not misconceived matters, the author's idea of Mendelian segregation is enticingly simple. If when two organisms are crossed, The F_1 generation is uniform and the F_2 generation comprises two types in the ratio of three to one, the inheritance is Mendelian. No circumstance whatever may modify the definiteness of these phenomena under pain of their disqualification as examples of Mendelian inheritance.

It would be rash to assert that Mendelism even in the broadened sense with which the word is used today, covers all types of inheritance. Correns' and Baur's experiments on chromatophores and Goldschmidt's work on the gypsy moth indicate the possibility of inheritance through the cytoplasm, while Mendelian data parallel chromosome distribution.

On the other hand, it is even more bold to assert that inheritance in Oenothera is definitely nonmendelian. They cannot be placed in either category with certainty, but it ought to be emphasized that no single fact discovered by those who have made pedigree cultures of the group, precludes a Mendelian interpretation. Gates' arguments against Mendelian interpretation of heredity in the evening primroses

reduce to four: (1) It has been definitely proven that *O. Lamarckiana* is not a hybrid; (2) Constant ratios of the usual Mendelian type are not found; (3) Splitting often occurs in the F_1 instead of the F_2 generations, sometimes with the production of two types unlike the parents (twin hybrids); and, (4) Chromosome differences appear.

In regard to the first point, it may be said that the finding of a single herbarium specimen hardly constitutes proof that the plant in question is or is not a hybrid The second point is covered by our remarks on the selective elimination of zygotes and gametes. The third argument overlooks a fundamental tenet of Mendelism. Crosses split first in the second hybrid generation, solely when the eggs on the one hand and the sperms on the other hand entering into the so-called F_1 generation were of the same factorial constitution. The mere act of producing a cross does not necessarily make the next generation an F_1 generation. The fact that *O. Lamarckiana* gives off variants is to many an indication that a cross between it and another form does not produce an F_1 hybrid. The frequency or infrequency with which the aberrant types appear proves nothing as long as we are ignorant of the potentalities of the non-functional gametes and zygotes. With this ignorance to contend with, the variability of the ratios is even an argument in favor of segregation rather than mutation, for it must be remembered that the same types continually reappear, whereas by DeVriesian theory mutations are equally likely to occur in any direction. The fourth argument of the author is really a question of terminology. If the behavior of the chromosomes is the efficient cause of Mendelian phenomena, then even aberrant mitoses at reduction are in the broad sense Mendelian. They hold possibilities of variation without that true germinal change which may be pictured as a chemical reconstitution independent of the mechanics of cell division.

In calling attention to these points, however, the reviewer does not wish to have it understood that he denies mutation. Wide variations and narrow variations as opposed to mere adaptive fluctuations certainly appear, and some of these variants may have been produced independently of "slips" in cell division. But it seems to him unwise to make the case rest upon the Oenothera data. The author speaks truly when he says that "biology has passed the stage when single evolutionary factors, no matter how insistently urged or how brilliantly advocated, can be held accountable for the great diversity of life which we see around us." — E. M. East.

ERRATA.

Page 30, line 3; *for* Hamden *read* Hampden.
" 31, " 34; *for* confirms *read* confirm.
" 32, " 1; for *Mongaric* read *Morgani.*
" 66, " 10; *for* 400 *read* 700.
after that *insert* some of
" 66, " 11; *for* between 100 and 200 *read* of about 400.
" 66, " 15; *after* that *insert* one of
for station *read* stations.
" 66, " 16; *for* below 600 *read* of 720.
" 71, " 16; *for* northwestern *read* northeastern.
" 72, " 12; for TERETOLOGICAL read TERATOLOGICAL.
" 102, " 20; *for* heft *read* Heft.
" 146, " 29; *after* L. *insert* a comma.
" 148, " 32; *after* T. & G. *insert* a comma.
" 151, " 24; for *Brittanica* read *Britannica.*
" 151, " 25; for *Radula* read *radula.*
" 152, " 38; for *Filix-foemina* read *Filix-femina.*
" 184, " 3; for *O. Williamsii* read *E. Williamsii.*
" 198, " 31; *after* Gaspé *insert* and.
" 219, " 28; for *Aehillea* read *Achillea.*

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